Compact disc player CD104

Service
Service
Service

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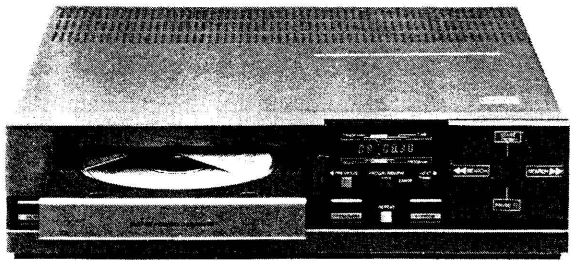

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Service Manual

COMPACT disc DIGITAL AUDIO

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1. Elucidation on the lay-out and table of contents per page.
2. Control buttons and technical specification.
3. Servicing hints.
4. Measurements and adjustments.
5. Exploded views and parts lists of mechanical parts.
6. Block diagram, circuit diagrams, data on PCBs, parts lists of electrical parts and wiring diagram.
7. Faultfinding method.
8. Modifications.
9. Additional information.

Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.

CLASS 1
LASER PRODUCT
3122 110 03420

Documentation Technique Service Dokumentation Documentazione di Servizio Huolte-Ohje Manual de Servicio Manual de Servicio

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1. ELUCIDATION ON THE LAYOUT OF THE DOCUMENTATION

The documentation consists of chapters.
The number of the chapter is indicated by the first digit of the page number.
The second digit of the page number is the sequence numbering.

If modifications or supplements require new supplementary or replacement pages, the page number is extended with a third part:

A digit behind the page number indicates that it concerns a supplementary page.
A replacement page is indicated by a letter behind the page number.

Example

3-6 is page 6 of chapter 3

3-6-1 is a supplementary page behind page 3-6

3-6-a is the replacement page of page 3-6 (so page 3-6 can be removed from the documentation).

All pages are provided with a date of issue.

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2. CONTROL BUTTONS

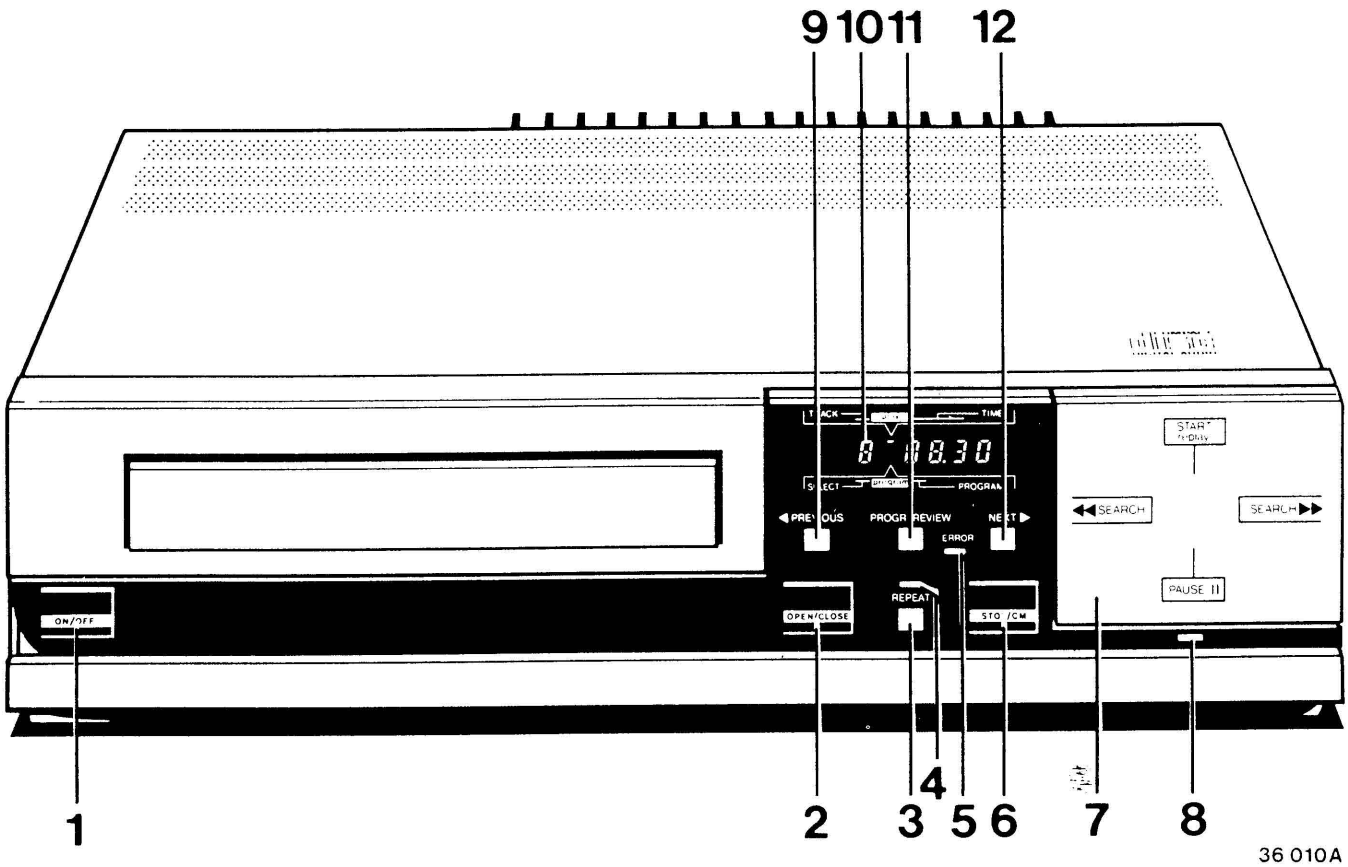

Fig. 1

1. 'ON/OFF' key: for switching the player on and off
2. 'OPEN/CLOSE' key: for opening and closing the tray
3. 'REPEAT' key: for repeating a disc or a program
4. 'REPEAT' LED: comes on when you press the REPEAT key
5. 'ERROR' LED: flashes when you make an operating or programming error
6. 'STOP/CM' key: for stopping the playback process prematurely ('STOP') and for clearing a programme ('CM" = Clear Memory)
7. Multi key: for starting playback ('START'), returning to the beginning of a number ('replay'), searching quickly for a passage ('◁◁ SEARCH' and 'SEARCH ▷▷') and holding the beginning of a number or a passage or for interrupting playback ('PAUSE')
8. 'PAUSE' LED: comes on when you depress 'PAUSE'
9. 'PREVIOUS' key: for returning to a previous number during playback and storage of a program
10. Multi-indicator: is capable of showing, after insertion of the disc, the quantity of numbers and the total playing time and indicates, during playback, which number is being played and how much playing time of it has already passed; is used in programming to indicate the numbers you want to store, and shows the numbers stored
11. 'PROGR/REVIEW' key: for storing the numbers of a program and for displaying the program stored
12. 'NEXT' key: for passing over to the next number during playback or storage of a program

TECHNICAL SPECIFICATION

- System : Compact Disc Digital Audio System
- Mains voltages : 110 V, 127 V, 220 V, 240 V ± 10% (to be changed by changing the transformer connections)
  : CD104/01
  110 V, 127 V, 220 V, 240 V switchable with the help of the voltage adapter
  : CD104/07
  117 V (with a special transformer)
- Mains frequencies : 50 Hz, 60 Hz (no conversion required)
- Power consumption : ≤ 30 W
- Frequency range : 20 Hz ÷ 20 kHz ± 0.3 dB
- Output voltage : max. 2 V_{rms}/≥2.2 kΩ
- Output impedance : ≤ 100 Ω
- S/N ratio : ≥ 90 dB
- Channel separation : ≥ 86 dB
- Channel difference : < 0.3 dB
- Overall harmonic distortion : ≤ 0.005% (0 dB)
- Intermodulation-distortion : ≤ 0.005% (0 dB)
- De-emphasis : 0 or 15/50 μs (switched by the subcode on the disc)
- Dimensions (wxhxd) : 320x86x300 mm (tray closed)
  : 320x86x450 mm (tray opened)
- Weight : approx. 7 kg

The above specifications apply within a frequency range of 20 Hz ÷ 20 kHz

SERVICING THE SUPPLY PCB

— Remove the 2 screws E (see Fig. 3).
— When the connectors have been loosened, the supply PCB can be taken out of the set from the rear.

Attention
The Audio cable is soldered to the decoder PCB.

When mounting the supply PCB care should be taken that the PCB falls in the guiding on the frame.

SERVICING THE SERVO PCB AND THE DECODER PCB (see Fig. 3)

— Remove the top cover.
— Remove the 2 screws A on the servo PCB.
— Remove screw B and bracket C.
— Loosen the motor control PCB of the drawer by undoing the 2 screws D.
— When the servo PCB is placed in the service position (see Fig. 4) measurement can be performed on both the servo PCB and the decoder PCB (component side).
— When the decoder PCB has to be taken out of the set, remove the bottom plate and the supply PCB.
Then remove the 2 screws at the component side of the decoder PCB and bracket C that is holding the decoder PCB.
When the connectors have been unplugged, the decoder PCB can be removed.

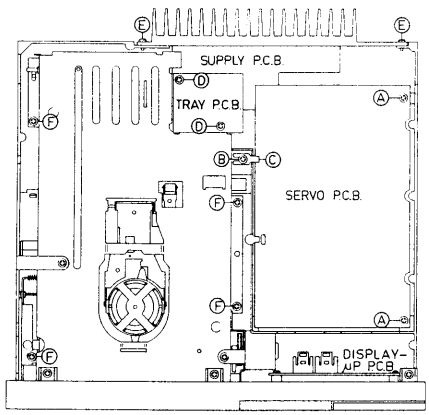

Fig. 3

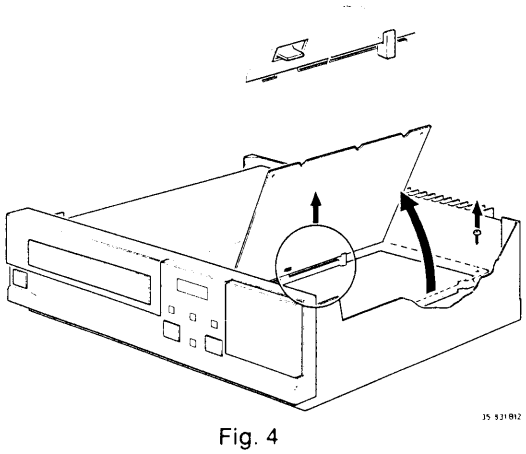

Fig. 4

SERVICING THE TRAY MECHANISM

Demounting the tray mechanism
— Remove the top cover.
— Remove the front.
— Remove the 4 screws F (see Fig. 3).
— Loosen connectos 61 and 64 on the tray control PCB.
— The tray mechanism can now be taken out of the set.
— For repairs the tray mechanism can be made operative outside the set by fixing again connectors 61 and 64 on the drawer control PCB.
— In voltageless condition the drawer can be opened by moving the drawer forward by means of a non-scratching sharp device (for example finger nails) that is placed between front and drawer.

Attention
If, during a repair, the tray mechanism or the tray control PCB has been demounted, the set will not function.
To avoid this the contacts of the tray in-end switch SK2 on the tray control PCB should be interconnected.

Replacing the disc hold-down

— See: Exploded View Tray.
— Place the disc hold-down (item 107) in its highest position (drawer opened as far as possible).
— The disc hold-down can be loosened by bending the 2 lugs on bracket item 508 apart and taking out the disc hold-down.

Replacing the tray motor

— See: Exploded View Tray.
— Demount the tray mechanism.
— Remove the belt (item 129) from the motor pulley.
— Remove the 2 screws with item no. 119.
— The motor can now be loosened.

Demounting the drawer (item 127) and lifting plate (item 513) assy

See: Exploded View Tray.
— Demount the tray mechanism.
— Remove motor bracket item 509 by undoing the 3 screws on bracket item 509.
— Remove roller item 108 by loosening the spring ring.
— Slide the tray forward and remove it.

3. SERVICING HINTS

In order to prevent loose metal objects from getting in the CD mechanism it will be necessary to see to a clean repair station.
Before the player is being used or serviced, the transportation screws should be removed.
These screws have to be reapplied after servicing.

The objective can be cleaned with a blow brush.

For servicing hints for the CD mechanism refer to Service Manuals CDM-0 and CDM-1.

Do not loosen any screws other than those mentioned in the hints.

The player consists of various MOS ICs. Since MOS ICs are generally very sensitive to overload and overvoltage, servicing operations should be performed with the utmost care. For further instructions see the information leaflet in the package of the ICs.
In the player chip components have been applied. For insertion and removal of chip components see the figure below.

The disc should always bed down well on the turntable. For this purpose a disc hold-down has been mounted in a bracket of the drawer mechanism.
When the drawer mechanism has to be demounted for repair, a loose hold-down should be employed.
The set can then function normally.
Code number of the disc hold-down is 4822 532 60906.

For adjustments that have to be performed on the lower side for which the unit should be in the position of normal end use, servicing supports are supplied. These supports can be mounted in the four holes of the frame.

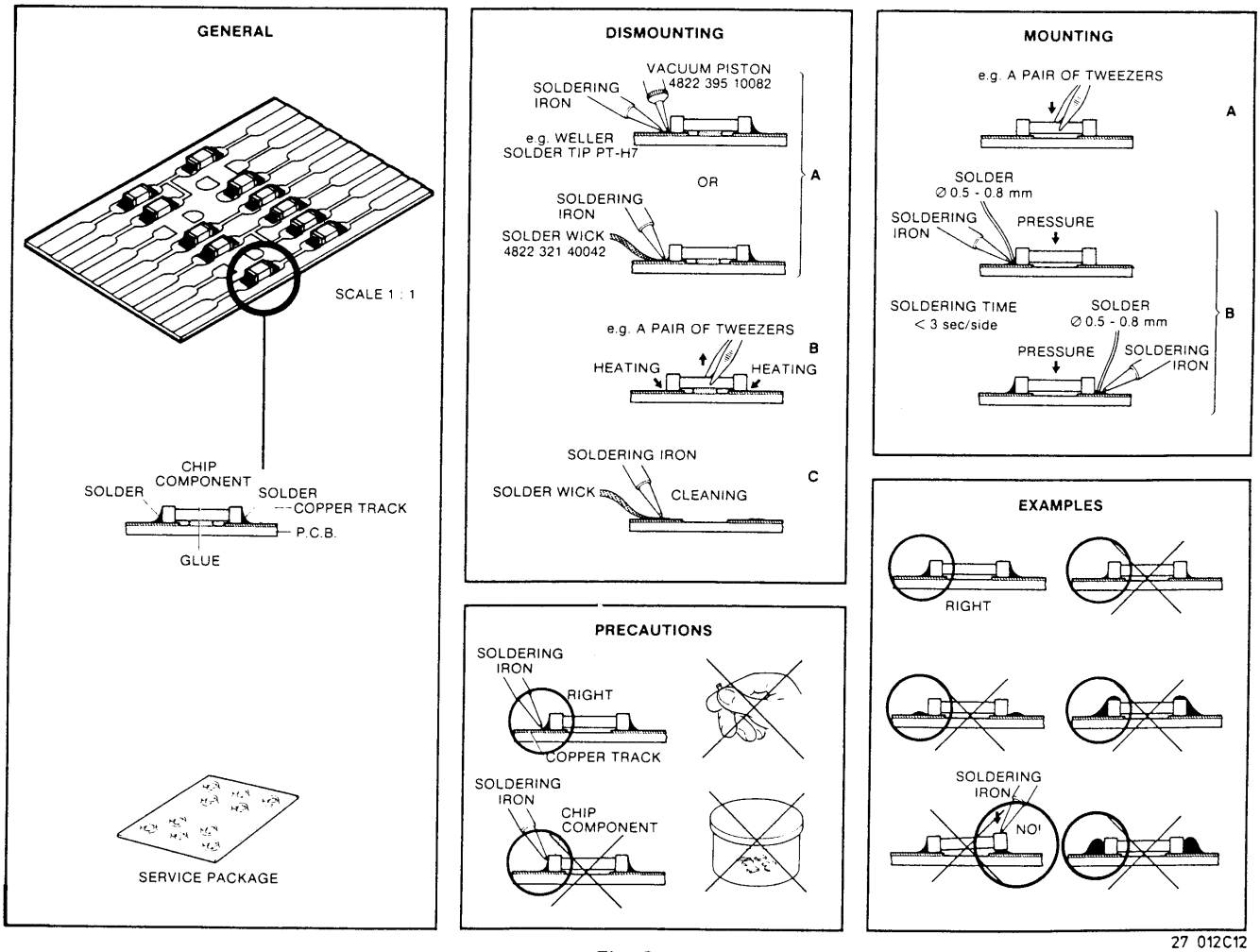

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Fig. 2

The servo μP can be set to the servicing mode to check the switch and display PCB and to separately test the servo systems.

INITIATING SERVICE LOOP A

— Put a disc on the turntable.
— Simultaneously depress the PAUSE, NEXT and STOP keys and hold them depressed while the mains voltage is switched on.
In this situation the laser and focus control are operative and the motor is running.
The light pen stays permanently under the lead-in tracks.
The radial servo system is switched off.
In this service loop the leds and the display can be checked as follows:
— The display will indicate 00—0102 and will increase and shift towards the left.
— If now the SEARCH REVERSE key is depressed, the REPEAT, ERROR and PAUSE leds will light up after two clock strokes of the display and, in the display, the play bar will light up.
The player remains in service loop A.

When the SEARCH REVERSE Key is pressed again the set returns to the previous mode.

INITIATING SERVICE LOOP B

The player can be brought from service loop A to service loop B by pressing the SEARCH FORWARD key. Now the radial servo system has been switched on independently of the P-bit and the sub-code.
In service loop B the display continues to indicate the same as in service loop A, except for the PLAY or PROGRAM bar.
The REPEAT LED will light up to indicate that the set is in service loop B.
After approx 1 minute music can be heard. (The time depends on the length of the running-in track).
From service loop B the set can be brought to the position of normal end use by pressing the START/REPLAY key while the set is displaying one of the musical numbers on the disc.

Remark:
If servo μP MAB8440/D034 has been built in, no music can be heard after approx 1 minute.
To make this possible the MUTE line to pin 39 of the ERCO can be interrupted and be applied to the +2 power supply voltage.

SERVICE AIDS

Service supports	4822 395 30202
Audio performance test disc	4822 397 30085
Disc without local defects, disc with DO failures, black spots and finger-prints	4822 397 30096
Screwdriver set TORX	
Set straight	4822 395 50145
Set square	4822 395 50132
Disc hold down	4822 532 60906
7 th order filter	4822 395 30204

DEMOUNTING THE TOP COVER

— Remove the 4 screws in the sides.
— Remove the cover from the set by pulling it backwards.

Attention
When mounting the top cover, care should be taken that the top cover is placed correctly in the guidings of the front before mounting the four screws.

DEMOUNTING THE BOTTOM PLATE

— Remove the 3 screws in the bottom plate.
— Pick up the bottom plate at the rear of the set and pull it from the 3 fixing bosses at the front of the set.

REPLACING GLASS FUSE 1451

— Remove the bottom plate.
— Now the fuse on the mains filter PCB is accessible at the lower side via a hole in the frame.
This hole is located between the left side of the set and the Compact Disc mechanism.
When the insulating paper is unfolded the glass fuse becomes visible.

REPLACING THE TRANSFORMER FUSE

— Remove the bottom plate.
— Remove the plastic cap covering the underside of the transformer.
— The transformer fuse is now accessible.
— Replace the screening cap once the fuse has been replaced.

SERVICING THE FRONT

Demounting the front.
— Remove the top cover.
— Remove the 3 fixing screws at the upper side and the 3 screws at the lower side of the front.
— The front can now be removed from the set by pulling it forwards.
— When the two plugs are removed from the connectors on the operating panel the front can be removed from the set.

Demounting the microprocessor and display PCBs

This is in fact one PCB made up of 2 loose PCBs that are interconnected with ribbon cables.
The microprocessor PCB can be demounted by removing the 2 screws.
When this PCB is turned over, the conductor side of the display PCB becomes visible.
The display PCB can be loosened by undoing the 5 screws on this PCB.

Attention
Some buttons now lie loose in the front. The multi-function button can be demounted by removing the clamping ring at the rear of the front and by undoing the 4 snap connections.

4. MECHANICAL MEASUREMENTS AND ADJUSTMENTS

MECHANICAL MEASUREMENTS AND ADJUSTMENTS TO BE PERFORMED ON THE CDM

- For checking and adjusting the angle setting see the Service Manual of the C.D.M.
- In case of adjustment of the height of the turntable by means of the set screw on the motor shaft, the voltage across resistor 3240 on the servo PCB should be set to 0 Volt.

Note:
For checking and adjusting the angle setting the drawer mechanism has to be demounted.
See sub servicing hints.

MECHANICAL ADJUSTMENTS OF THE TRAY MECHANISM

Adjusting the clearance of the disc (see Fig. 5)

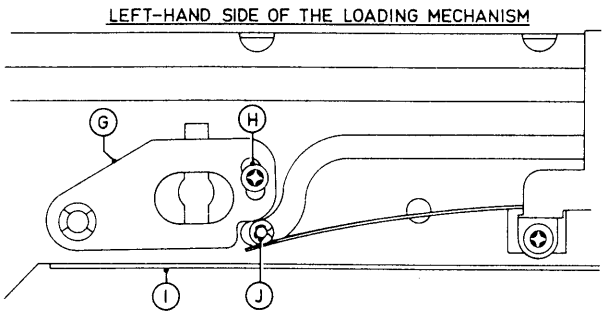

Fig. 5 36013A22

The disc may not rub against the black lifting plate (item 513 of the Exploded View Tray).
In case this should happen, the clearance can be adjusted with adjusting plate G and screw H.
With those the height of axis J of the lifting plate can be adjusted.
The adjustment should be performed with the drawer in position 'CLOSE'.
When screw H is loosened, adjusting plate G can be displaced in so far as this is allowed by the slotted hole of adjusting plate G.
If you can hear the disc rubbing, the adjusting plate should be adjusted.
In practice the disc will be adjusted parallel to edge I of the tray chassis.

Adjusting the play of the tray (see Fig. 6)

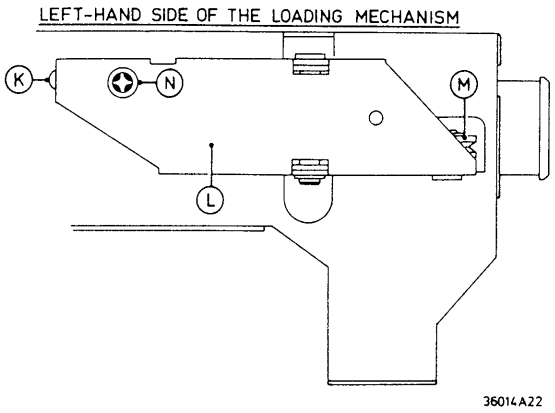

Fig. 6

Spiral spring K ensures that bracket L, with wheel M on it, presses against the drawer so that the play of the drawer becomes minimum.
Optimum adjustment is obtained when the distance between screw N and the drawer chassis is adjusted for 0.35 mm.

Adjusing the ornamental front of the drawer (see Fig. 7)

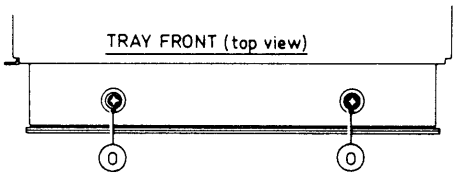

Fig. 7

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The position of the ornamental front of the drawer relative to the front of the set can be adjusted.
By means of screws O both the height and the position left-right can be adjusted.

ELECTRICAL MEASUREMENTS AND ADJUSTMENTS

Specification measurement

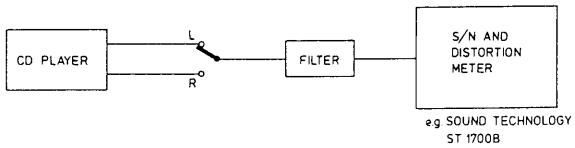

Fig. 8

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To measure the specification use can be made of audio test disc 4822 397 30085.
Use a 7th order filter, e.g. 4822 395 30204 (see Fig. 8), to measure:
— Total harmonic distortion (THD).
— Intermodulation distortion.
— Signal-to-noise ratio (S/N).

Changing the transformer connections

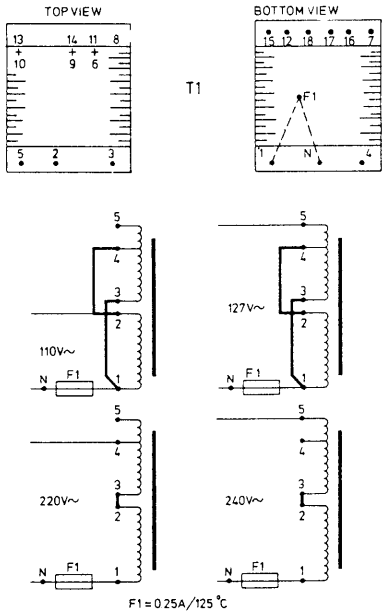


Fig. 9

36114A7

If the unit has to be connected to a mains voltage deviating from that mentioned on the type plate, the transformer connections should be changed as indicated in the figure.

Attention
In case of adaptation to 110 V or 127 V the glass fuse on the mains filter PCB must be changed from 200 mA-T to 400 mA-T.

Laser power supply (POS. VOLT. SH.)

For check and preliminary adjustment of the laser supply see Service Manual C.D.M.

Adjusting the laser supply

Play track 1 of test disc 4822 397 30096 (disc without defects).
Connect a DC voltmeter across resistor 3308 on the servo PCB (= on emitter of transistor 6239 and ground).
Adjust the laser power supply with resistor 3180 until the voltage across resistor 3308 is 575 ± 75 mV.

Adjusting the focus bandwidth

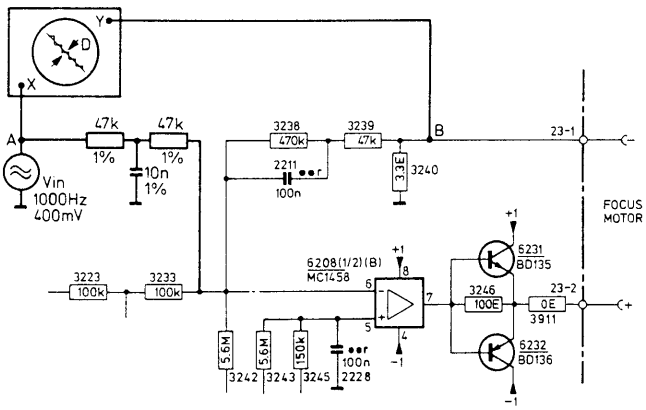


Fig. 10

36028 B12

Make a measuring arrangement according to the figure.
Play track 1 of test disc 4822 397 30096 (disc without defects).
Adjust trimming resistor 3158 (focus gain) on PRE. AMPL. + LASER PCB for a 180° phase difference between signals A and B.

Attention:
For some PCBs the focus gain has been called adjusting resistor 3138.

This corresponds with a minimum distance D in the Lissajous pattern.

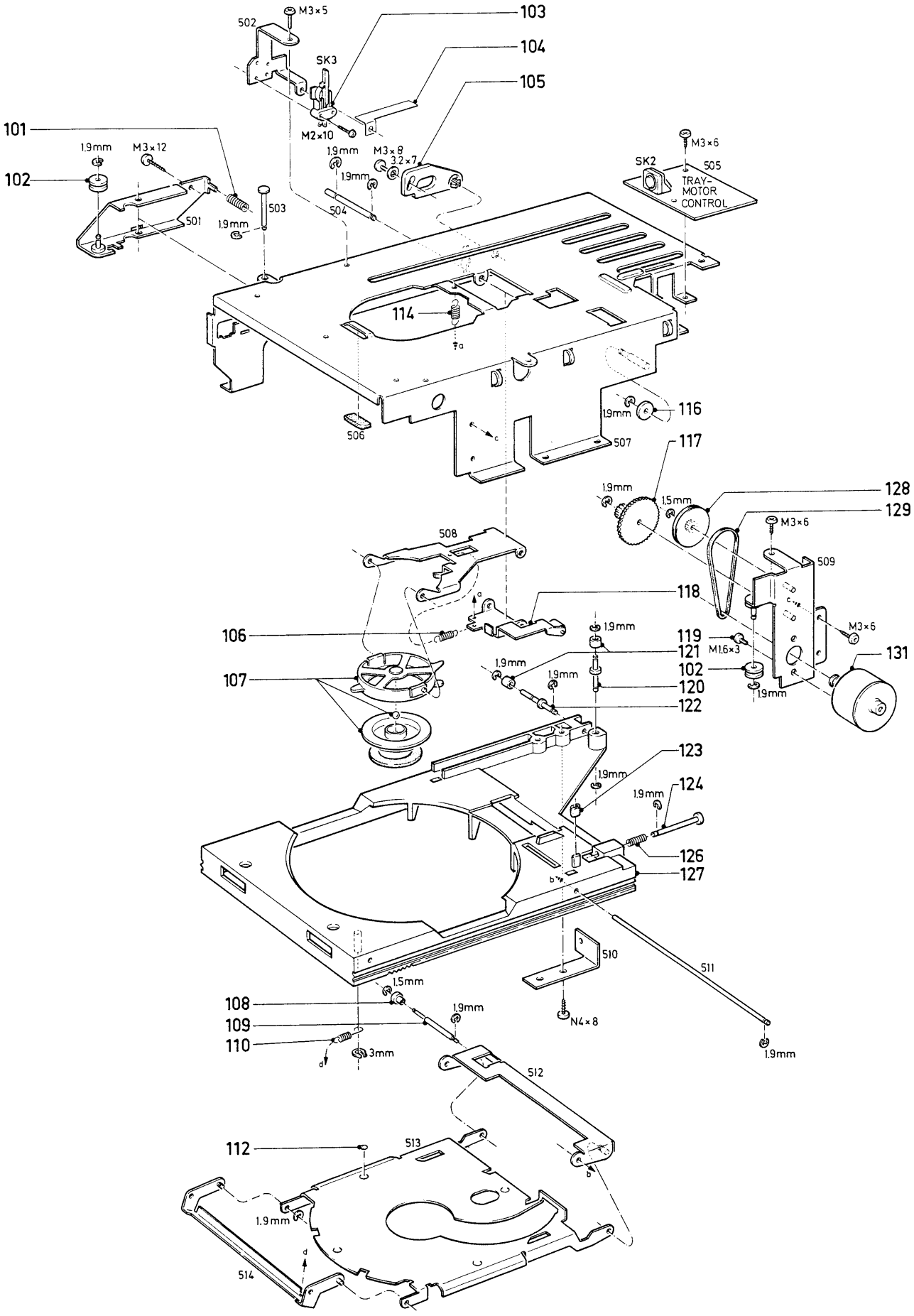
R = 47 kΩ - 1% 5322 116 54671
C = 10 nF - 1% 5322 121 54154

Check of the AGC and offset circuits

(See SERVO PCB)
Play track 1 of test disc 4822 397 30096 (disc without defects).
The voltage between pin 1 of IC6212 and ⊥ should be -4 V ± 2 V.
The voltage between pin 14 of IC6215 and ⊥ should be 0 V ± 2 V.

COMPACT disc DIGITAL AUDIO

EXPLODED VIEW TRAY



TRAY

101	4822 492 51628	119	4822 502 11699
102	4822 528 80977	120	4822 535 91712
103	4822 276 11277	121	4822 532 51521
104	4822 492 63071	122	4822 535 91719
105	4822 466 81483	123	4822 532 51518
106	4822 492 32396	124	4822 535 91711
107	4822 526 10261	126	4822 492 51627
108	4822 532 11114	127	4822 444 40113
109	4822 535 91709	128	4822 528 50177
110	4822 492 32404	129	4822 358 30335
112	4822 466 60965	131	4822 361 20483
114	4822 492 32395		
116	4822 532 51519		
117	4822 522 31777		
118	4822 402 60909		

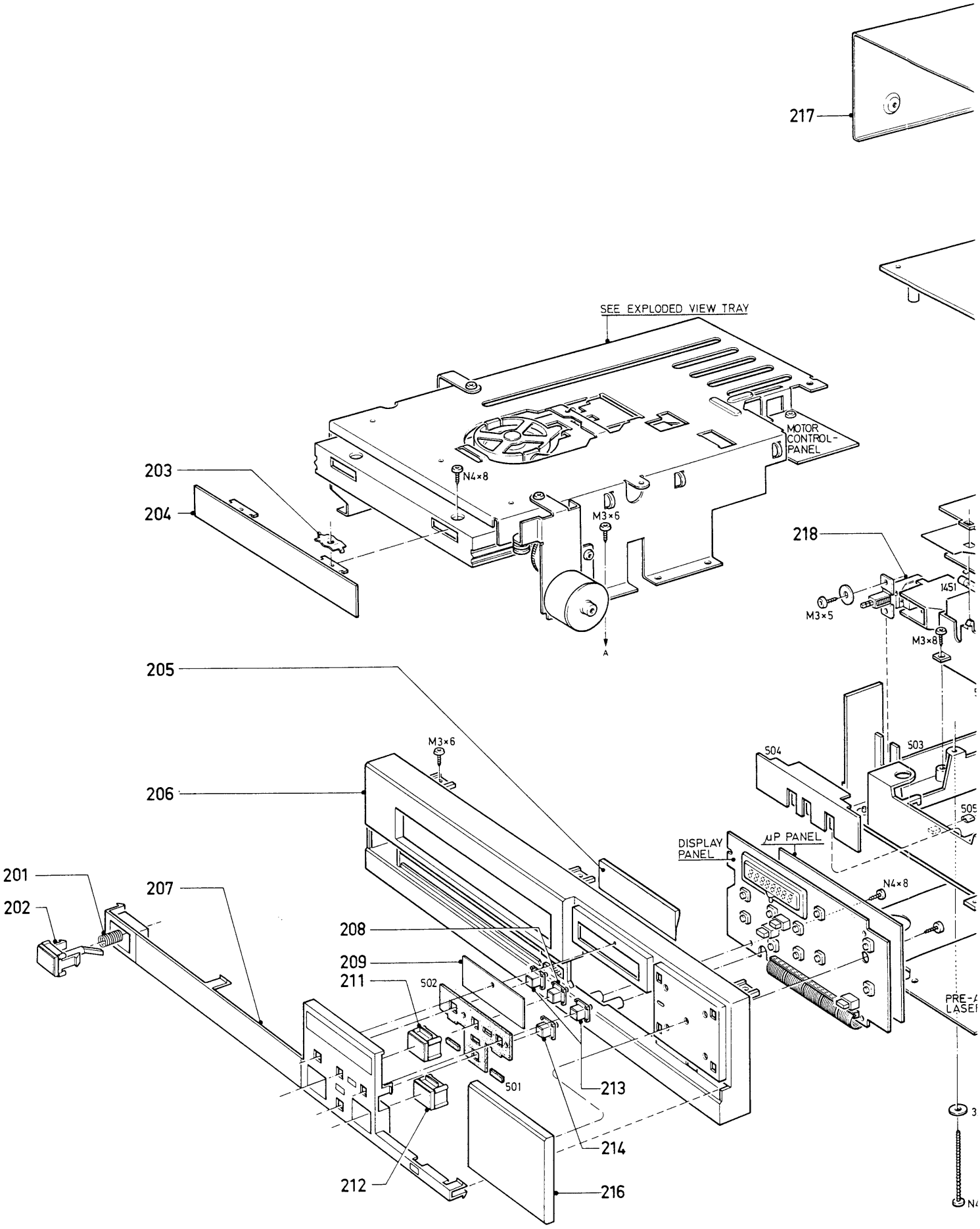
CABINET

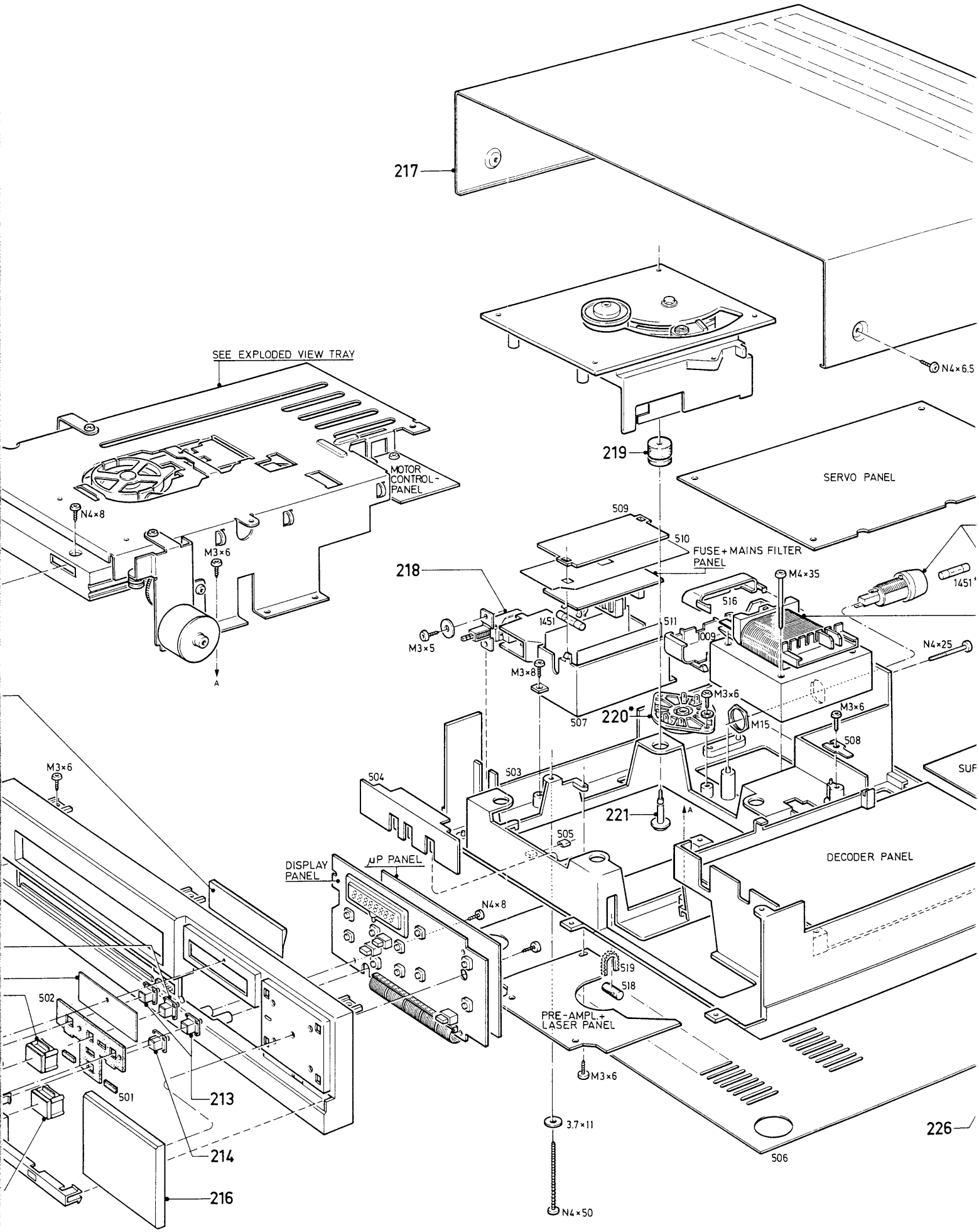
201	4822 492 51626	216	4822 410 23523
202	4822 410 23525	216	4822 410 23971 for CD104/30
203	4822 492 63038	217	4822 443 61296
204	4822 443 40148	217	4822 443 61457 for CD104/30
204	4822 443 40198 for CD104/30	218	4822 276 11262
205	4822 532 10284	219	4822 325 80226
206	4822 443 50451	220	5322 272 10215 for CD104/01
206	4822 443 50572 for CD104/30	221	4822 502 11613
207	4822 450 60411	222	4822 146 20894
208	4822 410 23521	222	4822 146 20897 for CD104/07
209	4822 450 60409	223	4822 255 40181
211	4822 410 23526	224	4822 492 63039
212	4822 410 23524	225	4822 256 30231 for CD104/01
213	4822 410 23522	226	4822 462 40409
214	4822 410 23519		

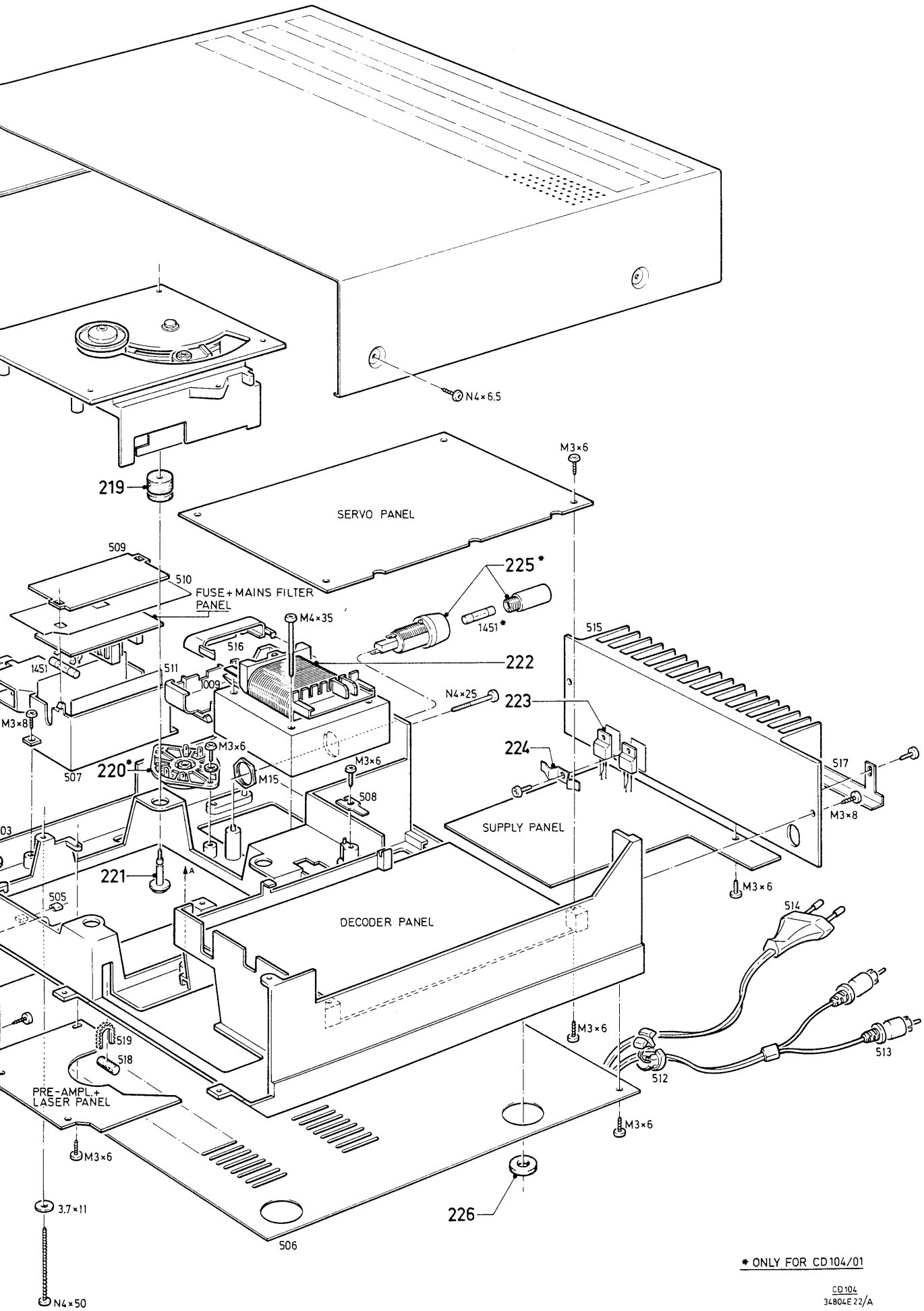
Note

For mechanical parts of the C.D. mechanism see Service Manual C.D.M.
Code number turntable motor 4822 361 20484.

EXPLODED VIEW CABINET



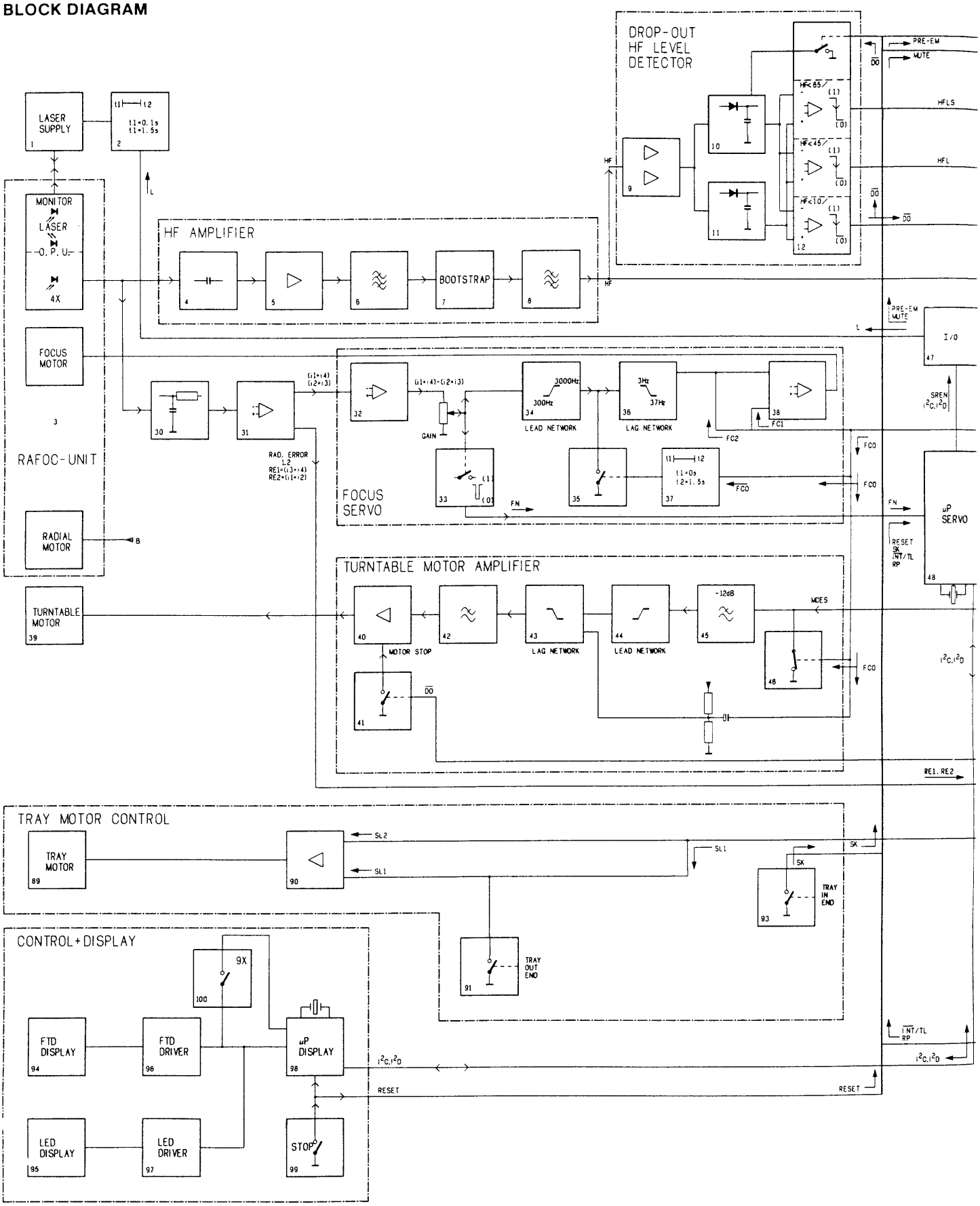

217
N4×6.5
SEE EXPLODED VIEW TRAY
MOTOR CONTROL-PANEL
N4×8
M3×6
A
219
SERVO PANEL
509
510
FUSE+MAINS FILTER PANEL
218
M4×35
1451'
516
1451
511
M3×5
M3×8
1009
N4×25
507
220
M3×6
M15
M3×6
508
M3×6
504
503
SUF
221
A
505
DISPLAY PANEL
μP PANEL
DECODER PANEL
N4×8
519
518
502
PRE-AMPL+ LASER PANEL
M3×6
501
213
3.7×11
226
214
506
216
N4×50

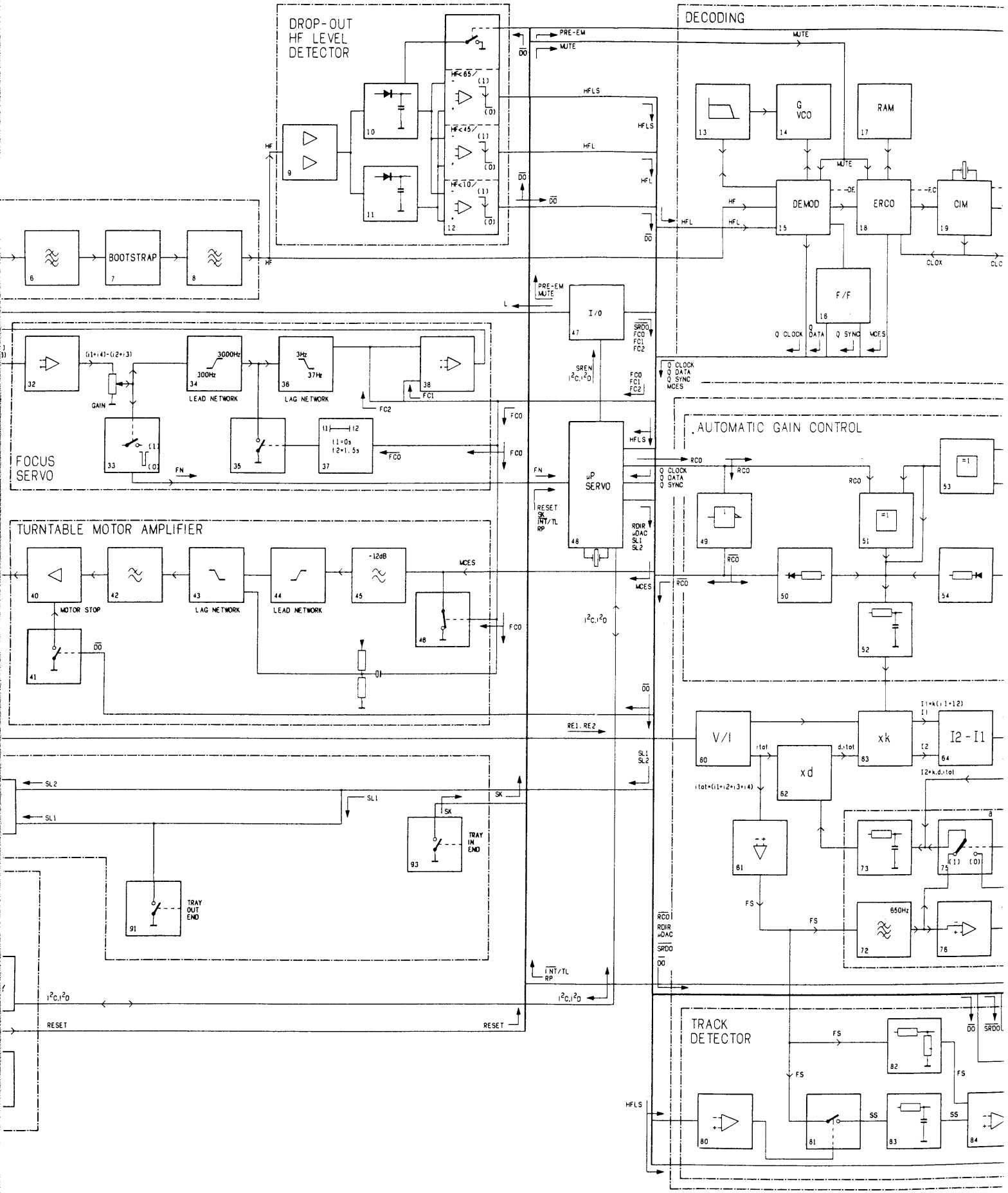


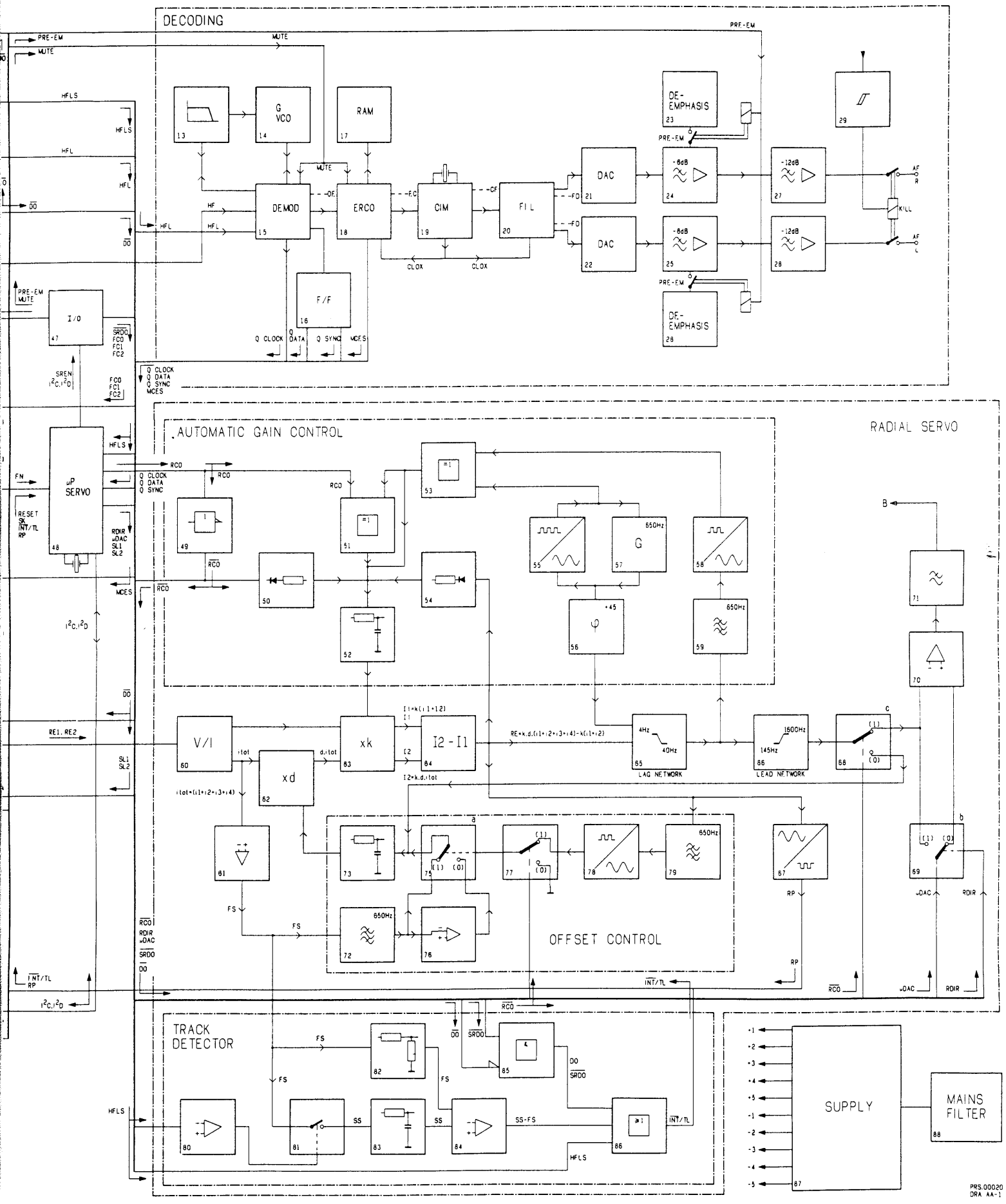
* ONLY FOR CD104/01

COMPACT disc DIGITAL AUDIO

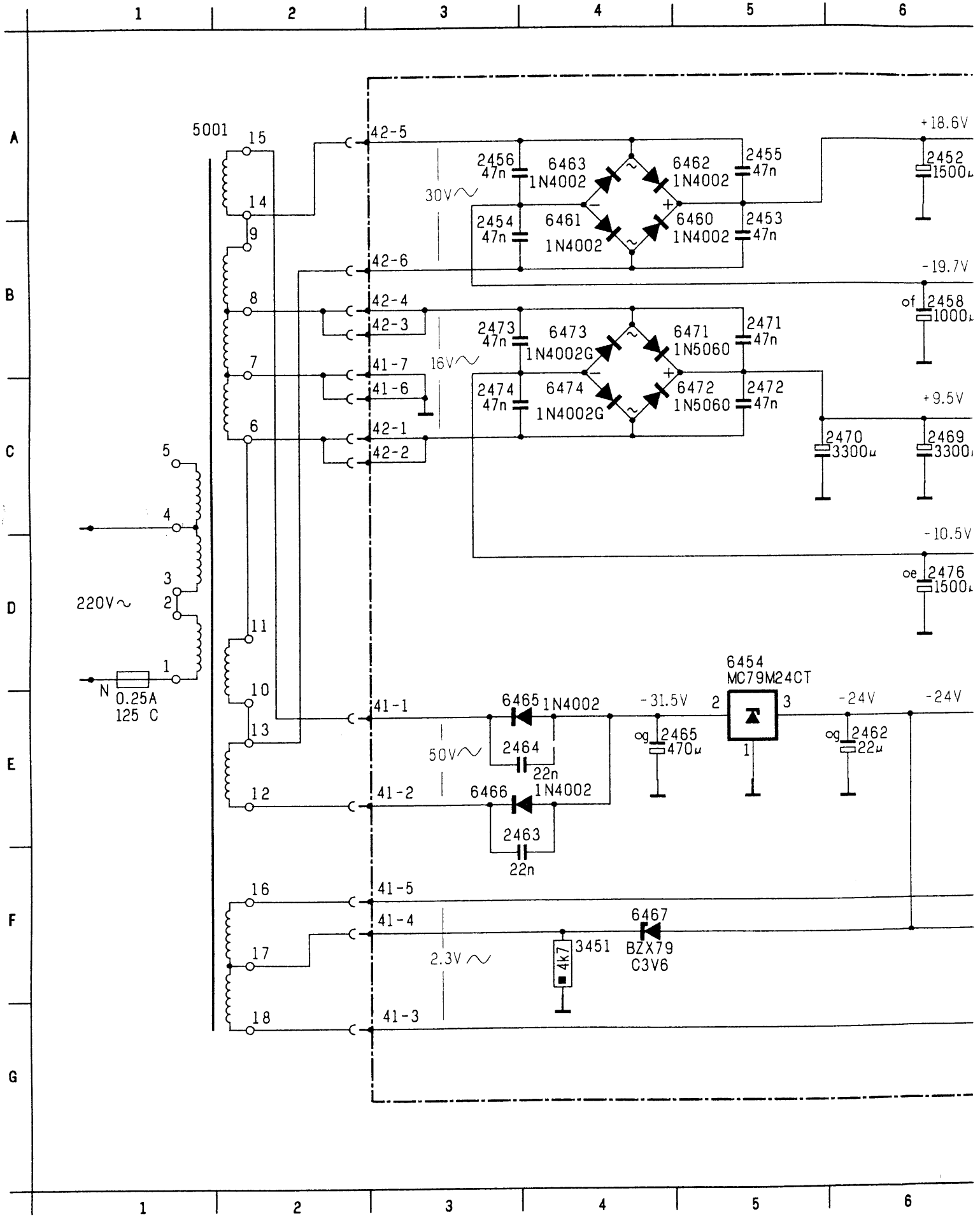
BLOCK DIAGRAM

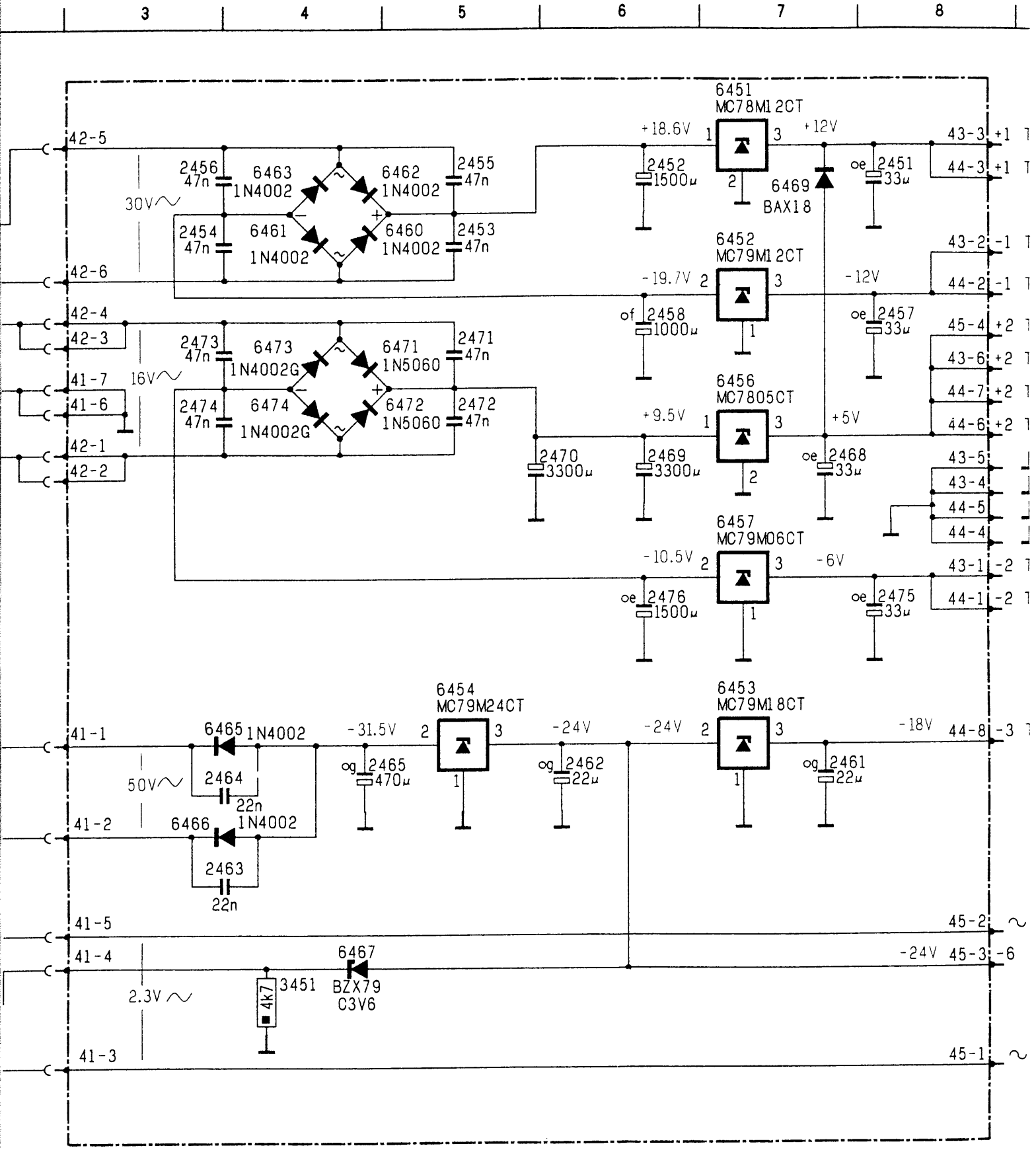


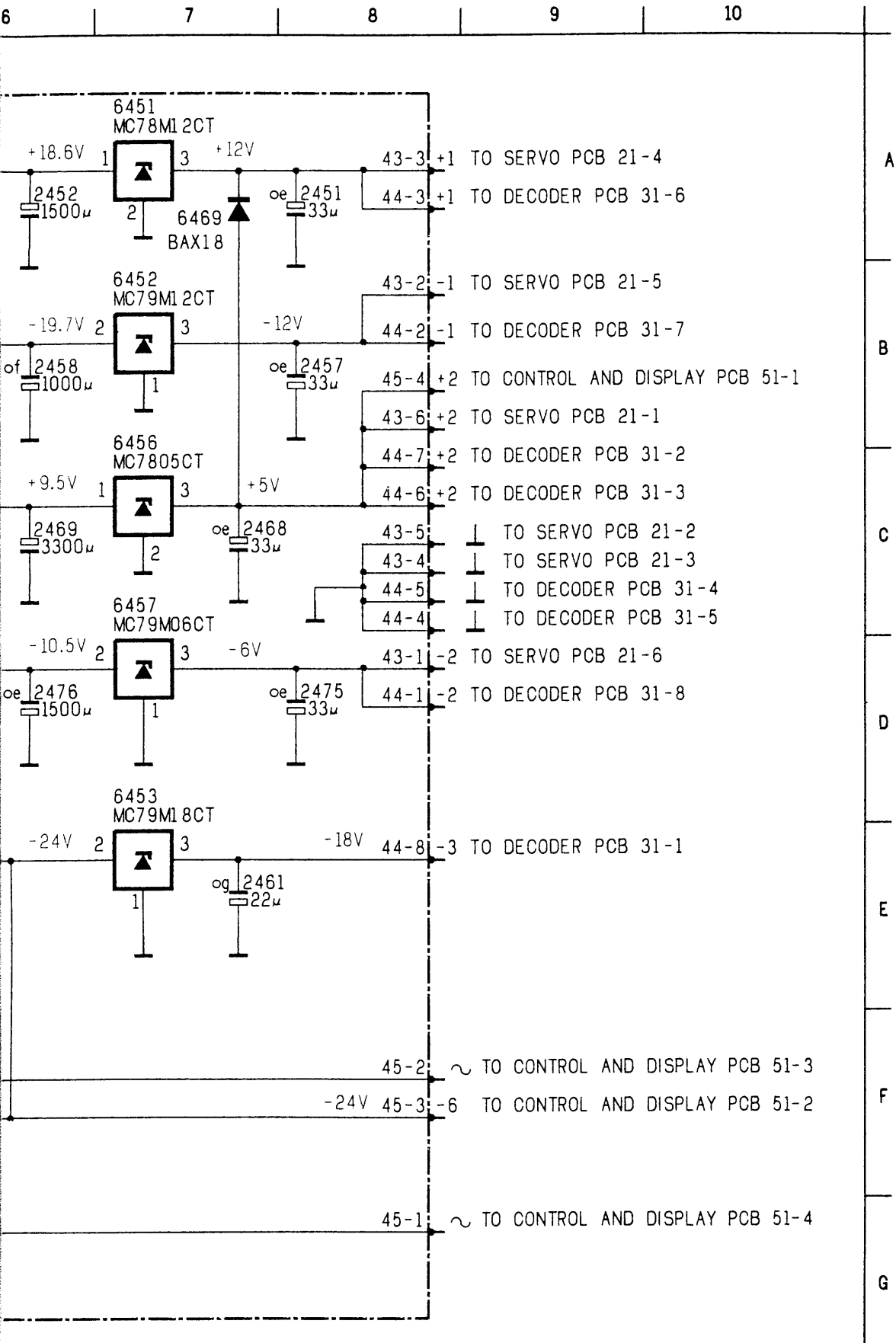

DROP-OUT
HF LEVEL
DETECTOR
DECODING
BOOTSTRAP
FOCUS
SERVO
LEAD NETWORK
LAG NETWORK
GAIN
AUTOMATIC GAIN CONTROL
TURNTABLE MOTOR AMPLIFIER
MOTOR STOP
LAG NETWORK
LEAD NETWORK
-12dB
TRACK
DETECTOR
TRAY
OUT
END
TRAY
IN
END
DEMOD
ERCO
CIM
RAM
F/F
I/O
µP
SERVO
V/I
xk
xd
I2 - I1
PRE-EM
MUTE
HFLS
HFL
RESET
INT/TL
RP
SRDO
FCO
FC1
FC2
RCO
RDIR
µDAC
SL1
SL2
MCES
FS
SS
SK
RE1. RE2
650Hz
3000Hz
300Hz
3Hz
37Hz


DECODING
PRE-EM
MUTE
HFLS
HFL
DO
G VCO
RAM
DEMOD
ERCO
CIM
FIL
DAC
DE-EMPHASIS
-6dB
-12dB
F/F
I/O
CLOX
Q CLOCK
Q DATA
Q SYNC
MOES
AUTOMATIC GAIN CONTROL
RADIAL SERVO
µP SERVO
RCO
RDIR
µDAC
SL1
SL2
V/I
xk
xd
I2 - I1
LAG NETWORK
LEAD NETWORK
OFFSET CONTROL
TRACK DETECTOR
SUPPLY
MAINS FILTER
FS
SS
SS-FS
INT/TL
RP
RE1.RE2
PRS.00020
DRA AA-1

SUPPLY CIRCUIT

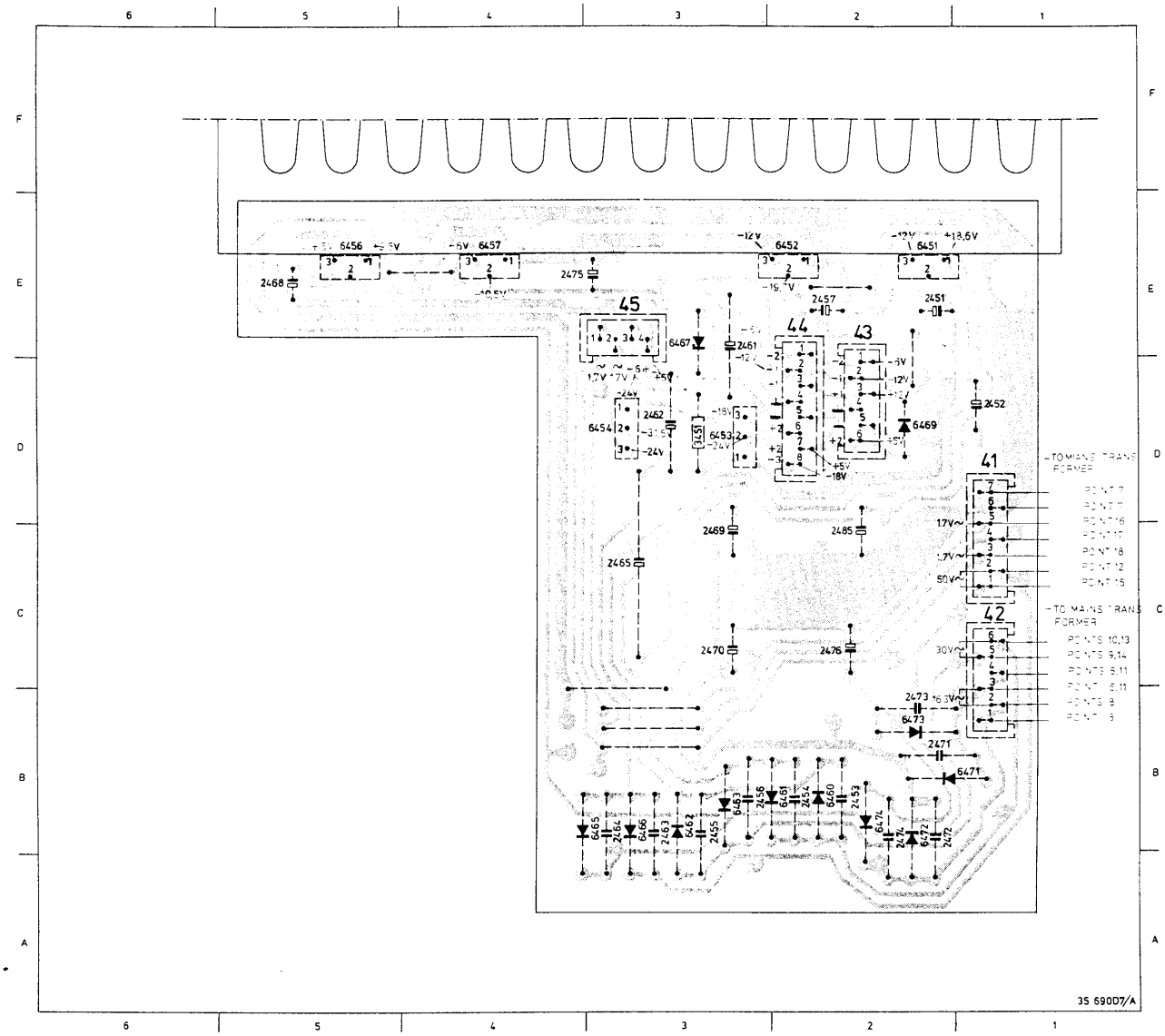



3
4
5
6
7
8
42-5
42-6
42-4
42-3
41-7
41-6
42-1
42-2
41-1
41-2
41-5
41-4
41-3
30V~
16V~
50V~
2.3V~
2456 47n
2455 47n
2454 47n
2453 47n
2473 47n
2471 47n
2474 47n
2472 47n
6463 1N4002
6462 1N4002
6461 1N4002
6460 1N4002
6473 1N4002G
6471 1N5060
6474 1N4002G
6472 1N5060
6465 1N4002
6466 1N4002
6467 BZX79 C3V6
2464 22n
2463 22n
3451 4k7
6451 MC78M12CT
6452 MC79M12CT
6456 MC7805CT
6457 MC79M06CT
6454 MC79M24CT
6453 MC79M18CT
6469 BAX18
+18.6V
+12V
-19.7V
-12V
+9.5V
+5V
-10.5V
-6V
-31.5V
-24V
-24V
-18V
2452 1500µ
2451 33µ
2458 1000µ
2457 33µ
2470 3300µ
2469 3300µ
2468 33µ
2476 1500µ
2475 33µ
2465 470µ
2462 22µ
2461 22µ
43-3 +1
44-3 +1
43-2 -1
44-2 -1
45-4 +2
43-6 +2
44-7 +2
44-6 +2
43-5
43-4
44-5
44-4
43-1 -2
44-1 -2
44-8 -3
45-2
45-3 -6
45-1



2451	A	8
2452	A	6
2453	B	5
2454	B	3
2455	A	5
2456	A	3
2457	B	8
2458	B	6
2461	E	7
2462	E	6
2463	E	4
2464	E	4
2465	E	5
2468	C	7
2469	C	6
2470	C	6
2471	B	5
2472	C	5
2473	B	3
2474	C	3
2475	D	8
2476	D	6
3451	F	4
6451	A	7
6452	B	7
6453	D	7
6454	D	5
6456	B	7
6457	C	7
6460	B	5
6461	B	4
6462	A	5
6463	A	4
6465	E	4
6466	E	3
6467	F	4
6469	A	7
6471	B	5
6472	C	5
6473	B	4
6474	C	4

SUPPLY P.C.B.



SUPPLY

MC78M12CT	5322 209 86176
MC79M12CT	4822 209 82065
MC79M18CT	4822 209 82054
MC79M24CT	4822 209 82055
MC7805CT	4822 209 80891
MC79M06CT	4822 209 82056

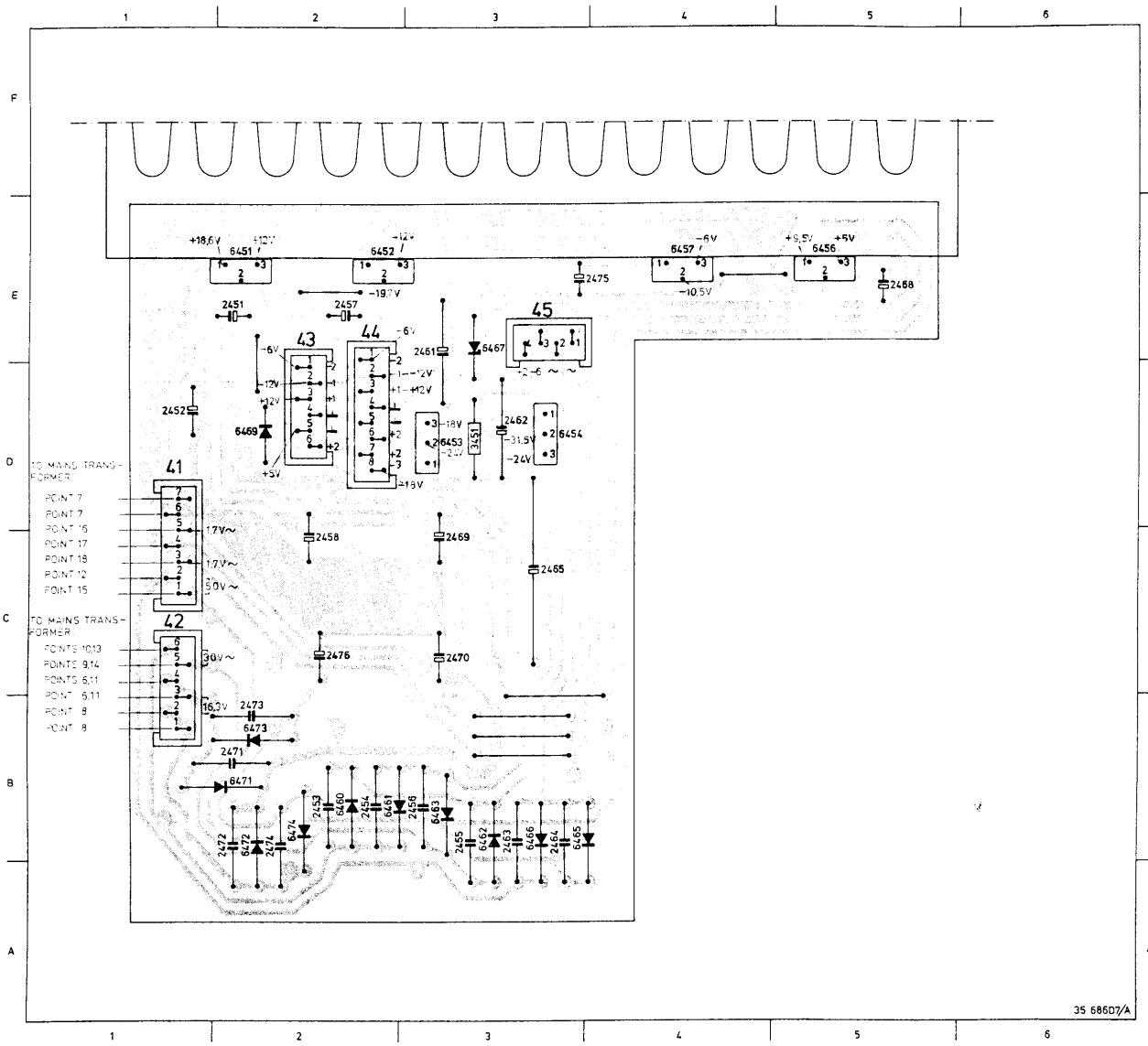
1N4002G		5322 130 30684
BAX18A		4822 130 31025
BZX79-C3V6		5322 130 34834
1N5060		4822 130 31164

2453÷2456 2471÷2474	47 nF- 50 V	4822 122 10288
2463, 2464	22 nF-100 V	4822 122 10289
2452, 2476	1500 µF- 25 V	4822 124 21471
2469, 2470	3300 µF- 16 V	4822 124 21469

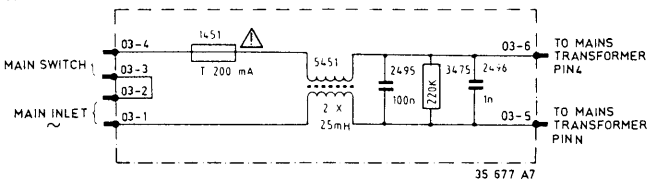
Miscellaneous

Mica washer	4822 255 40181
Spring clip	4822 492 63039
Mains transformer 1009	4822 146 20894
Transf. fuse 125° C/0,25 A	4822 252 20007

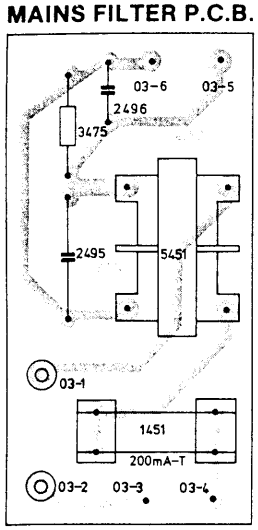
SUPPLY P.C.B.



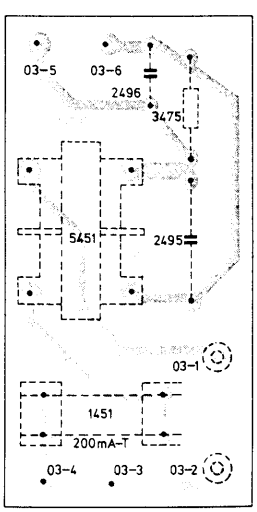
MAINS FILTER



MAINS FILTER P.C.B.



35 684 B7

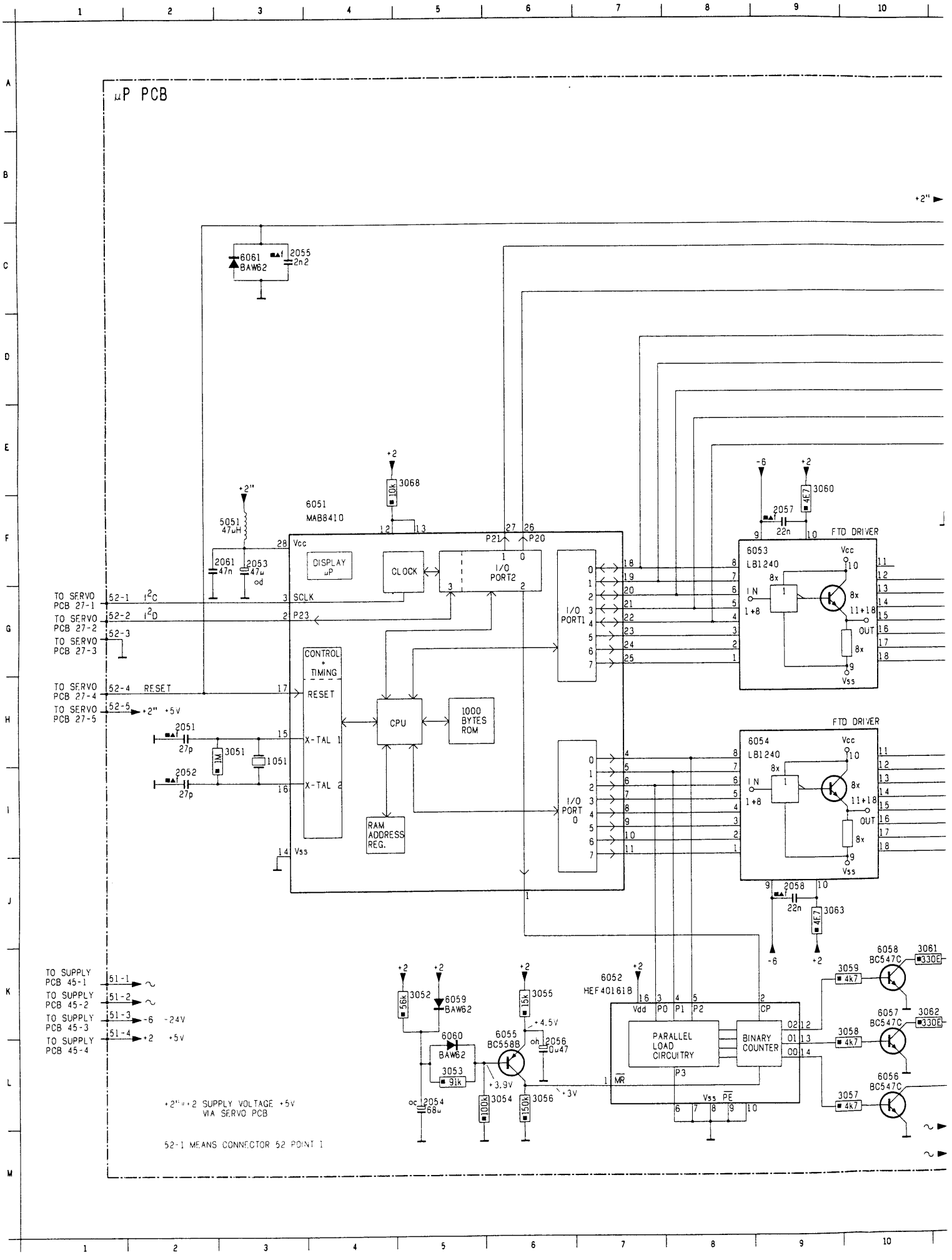


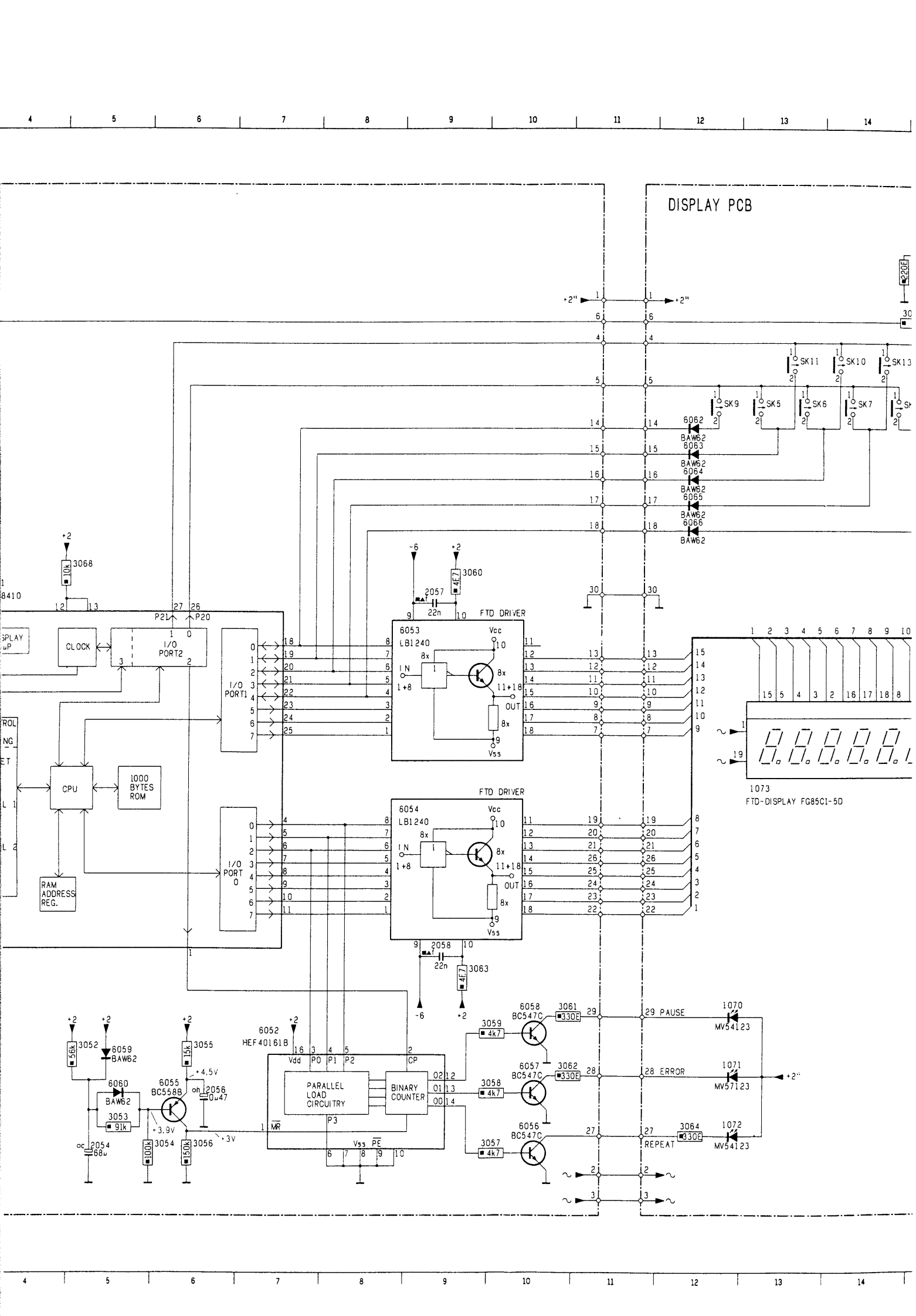
36156 B12

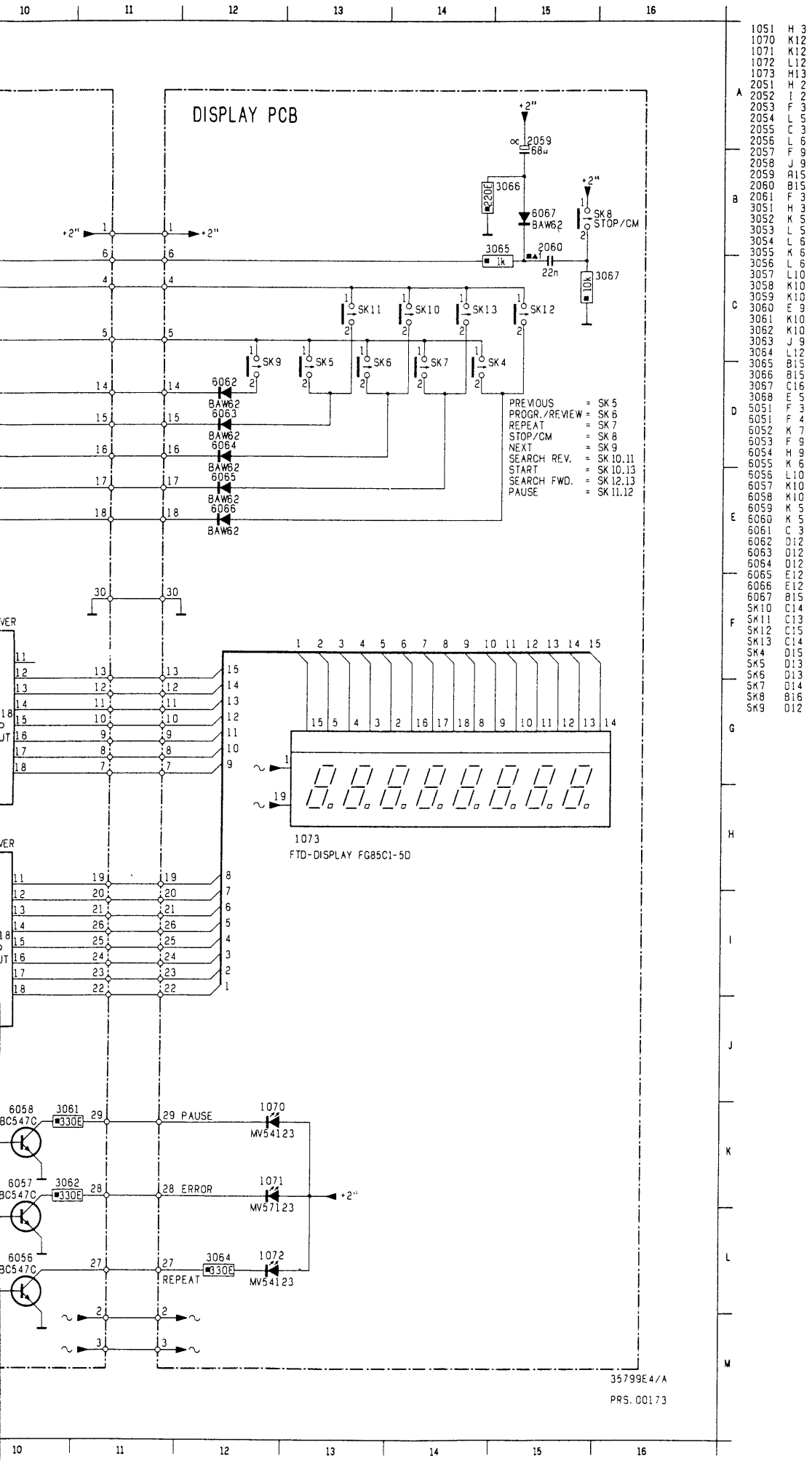
MAINS FILTER

5451	2x25 mH	4822 157 51576
2495 2496	100 nF- 250 V 1 nF-1000 V	5322 121 44302 4822 122 40368
3475	220 kΩ-VR 25	5322 116 64114
1451	220/240 V version 200 mAT 110/127 V version 400 mAT	 4822 253 30012 4822 253 30016
Miscellaneous		
Fuse holder springs		4822 492 60063

CONTROL + DISPLAY CIRCUIT

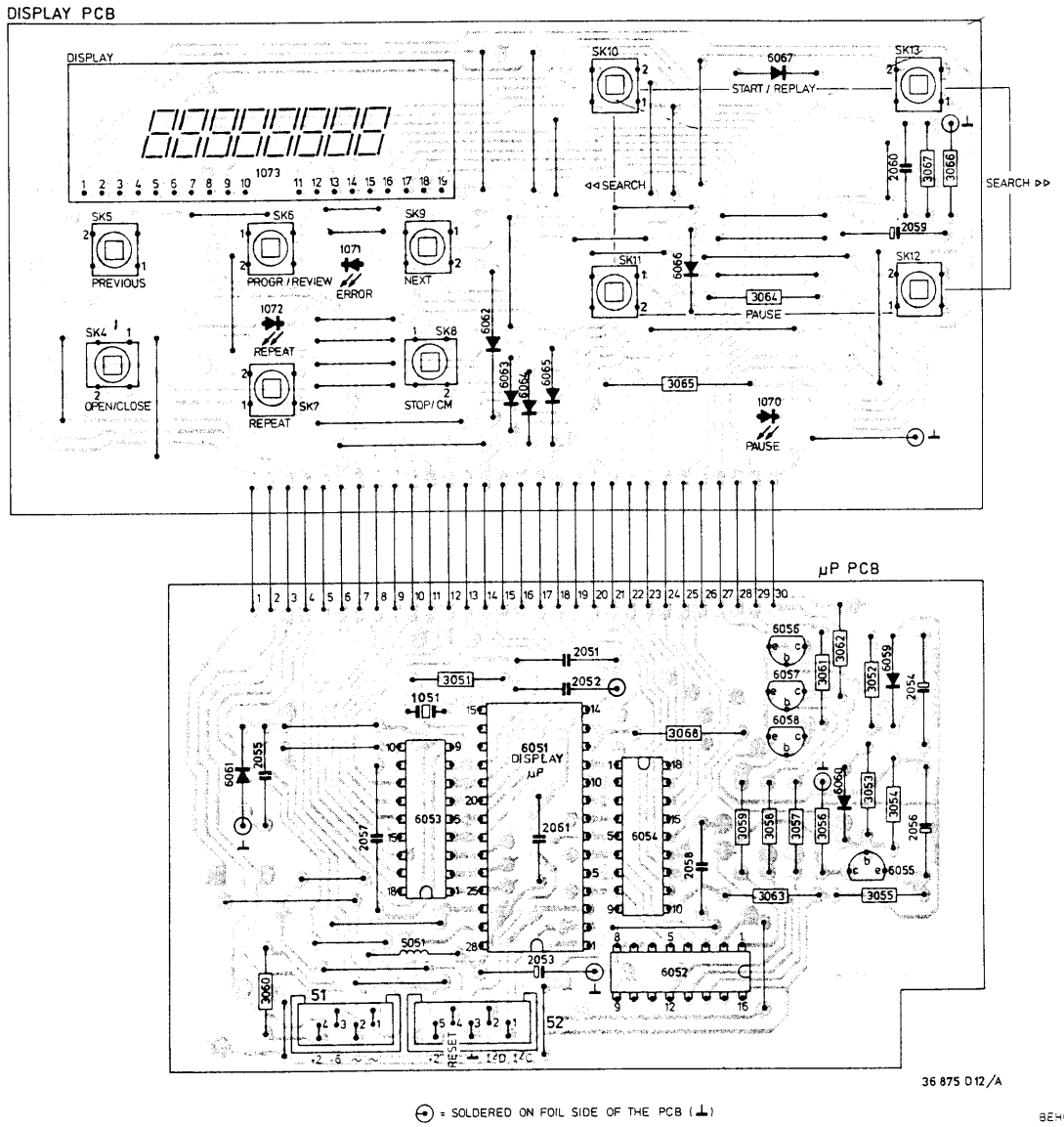



DISPLAY PCB
SK11
SK10
SK13
SK9
SK5
SK6
SK7
6062 BAW62
6063 BAW62
6064 BAW62
6065 BAW62
6066 BAW62
3068 10k
3060 4E7
2057 22n
FTD DRIVER
6053 LB1240
6054 LB1240
Vcc
Vss
IN
1+8
8x
11+18
OUT
2058 22n
3063 4E7
1073
FTD-DISPLAY FG85C1-5D
CLOCK
I/O PORT2
I/O PORT1
I/O PORT 0
CPU
1000 BYTES ROM
RAM ADDRESS REG.
6052 HEF40161B
Vdd
P0
P1
P2
CP
P3
MR
PE
PARALLEL LOAD CIRCUITRY
BINARY COUNTER
3052 56k
6059 BAW62
6060 BAW62
3053 91k
3055 15k
6055 BC558B
2056 0µ47
2054 68µ
3054 100k
3056 150k
+4.5V
+3.9V
+3V
6058 BC547C
6057 BC547C
6056 BC547C
3059 4k7
3058 4k7
3057 4k7
3061 330E
3062 330E
3064 330E
29 PAUSE
28 ERROR
27 REPEAT
1070 MV54123
1071 MV57123
1072 MV54123
+2"
-6
+2



1051 H 3
1070 K12
1071 K12
1072 L12
1073 H13
2051 H 2
2052 I 2
2053 F 3
2054 L 5
2055 C 3
2056 L 6
2057 F 9
2058 J 9
2059 A15
2060 B15
2061 F 3
3051 H 3
3052 K 5
3053 L 5
3054 L 6
3055 K 6
3056 L 6
3057 L10
3058 K10
3059 K10
3060 E 9
3061 K10
3062 K10
3063 J 9
3064 L12
3065 B15
3066 B15
3067 C16
3068 E 5
5051 F 3
6051 F 4
6052 K 7
6053 F 9
6054 H 9
6055 K 6
6056 L10
6057 K10
6058 K10
6059 K 5
6060 K 5
6061 C 3
6062 D12
6063 D12
6064 D12
6065 E12
6066 E12
6067 B15
SK10 C14
SK11 C13
SK12 C15
SK13 C14
SK4 D15
SK5 D13
SK6 D13
SK7 D14
SK8 B16
SK9 D12

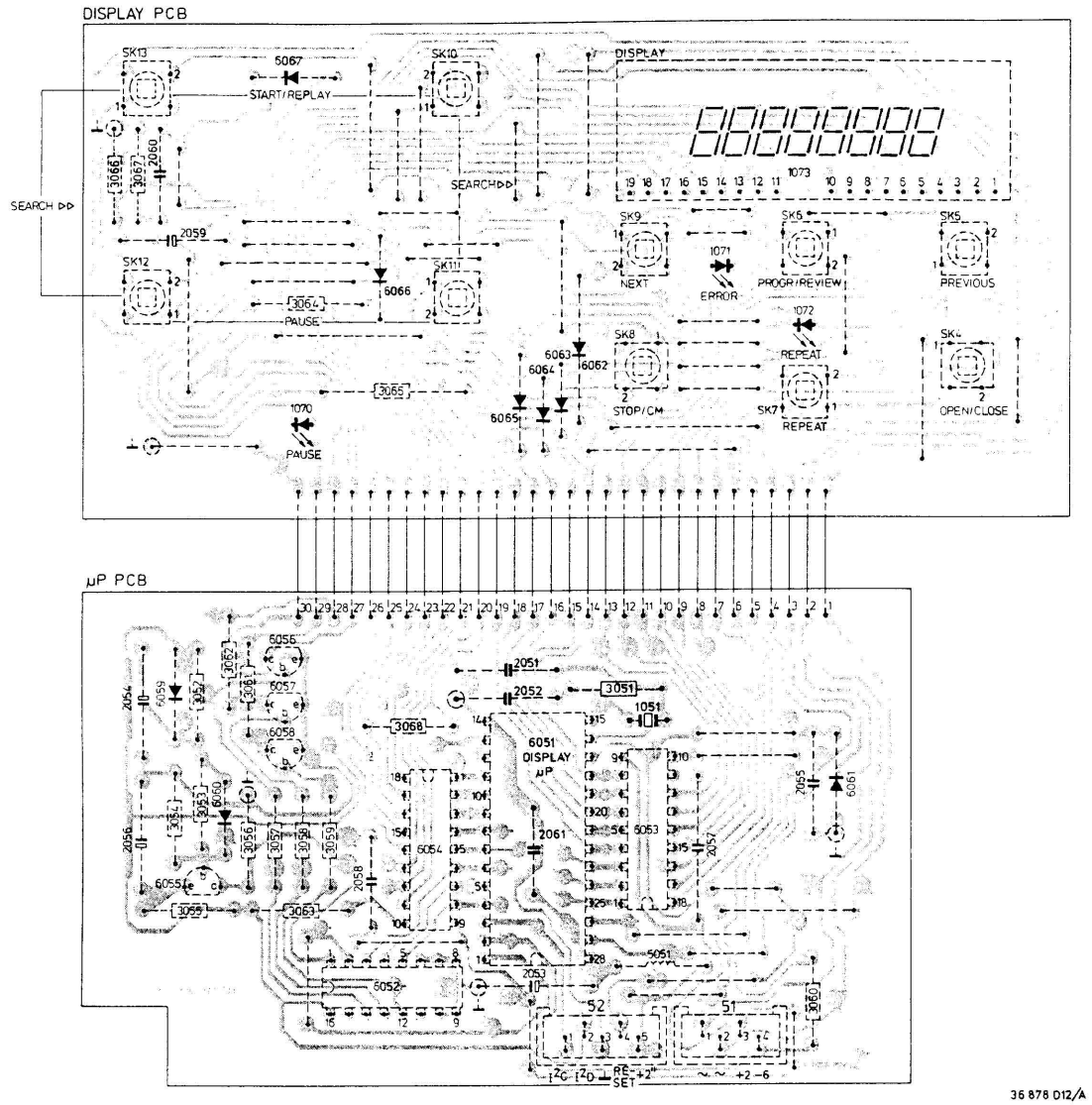
CONTROL + DISPLAY P.C.B.



CONTROL AND DISPLAY

ICs		
6051	MAB8410-B017	4822 209 10906
6052	HEF40161BP	5322 209 10344
6053, 6054	LB1240	4822 209 82057
Transistors		
BC547C		4822 130 40959
BC588B		4822 130 44197
Diodes		
BAW62		4822 130 30613
Coils		
5051	47 mH	4822 156 20966
Capacitors		
2061	47 nF-50 V	4822 122 10288
LEDs		
1070,1072	MV54123 (green)	4822 130 32222
1071	MV57123 (red)	4822 130 32301
I.C.		
	IC-socket 28p.	4822 255 40156

CONTROL + DISPLAY P.C.B.

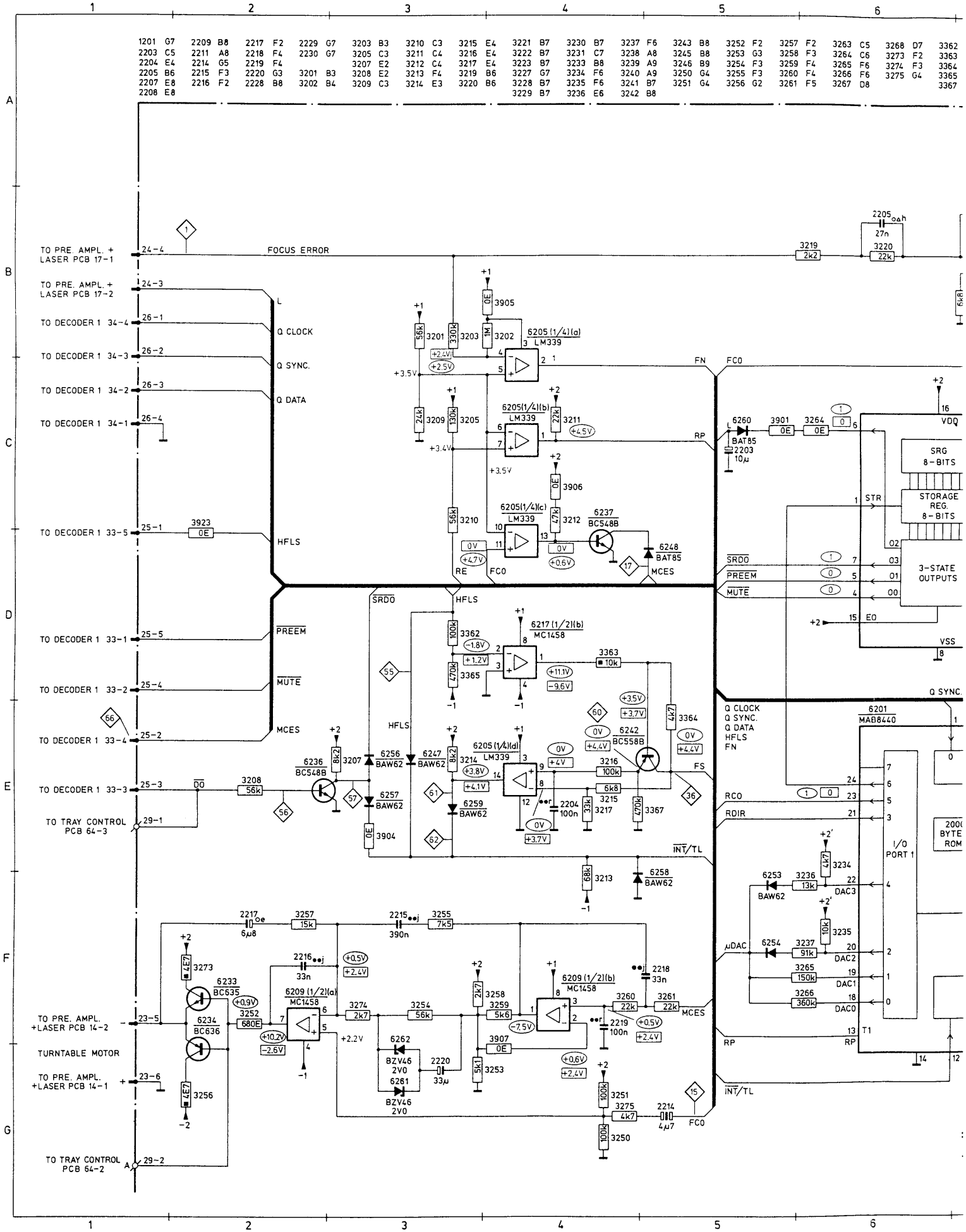


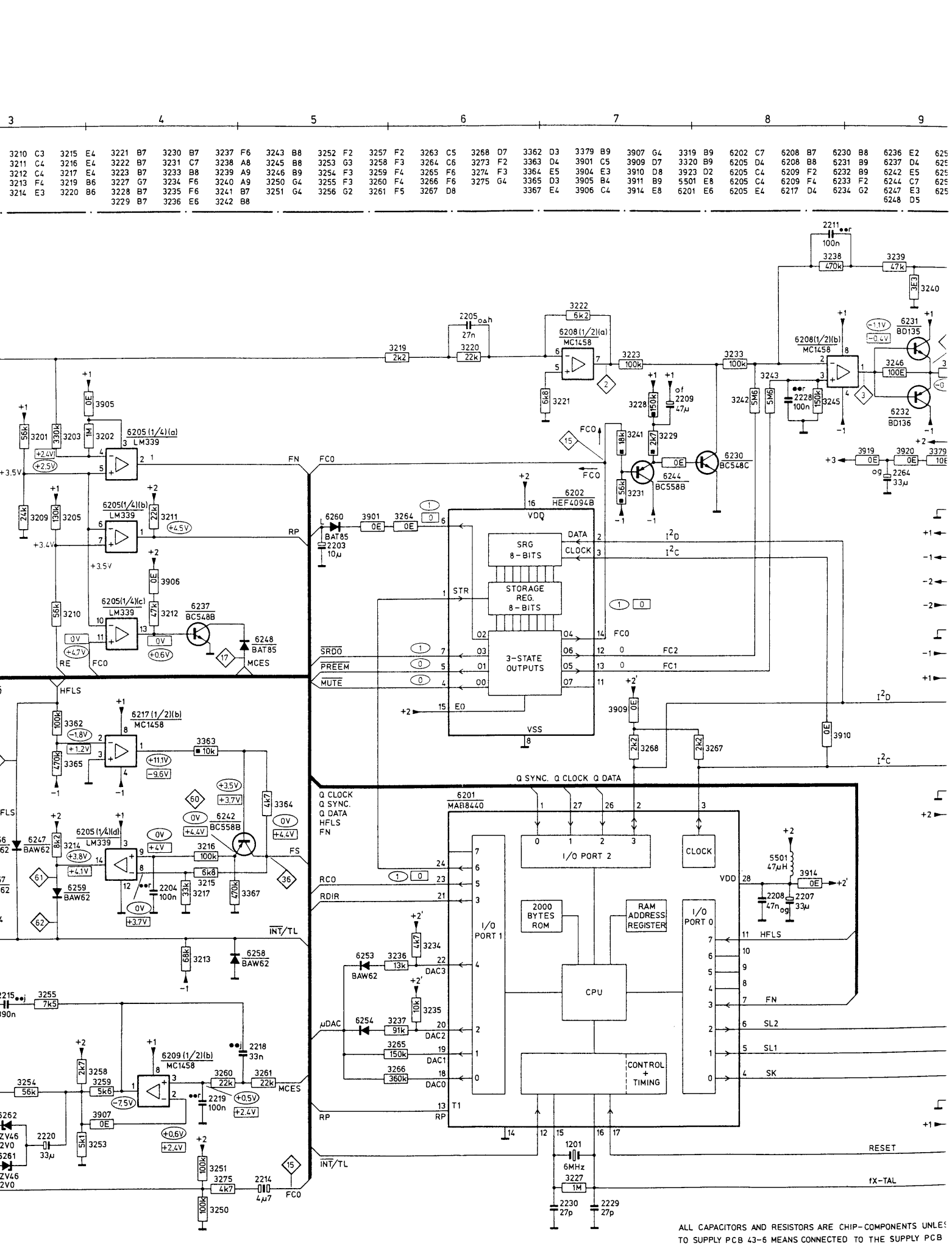
DISPLAY		
1073	FG85CI-5D FTD-Display	4822 130 90182
SK4÷13	Tact switch	4822 276 11276
1051	Quartz cristal	4822 242 70392

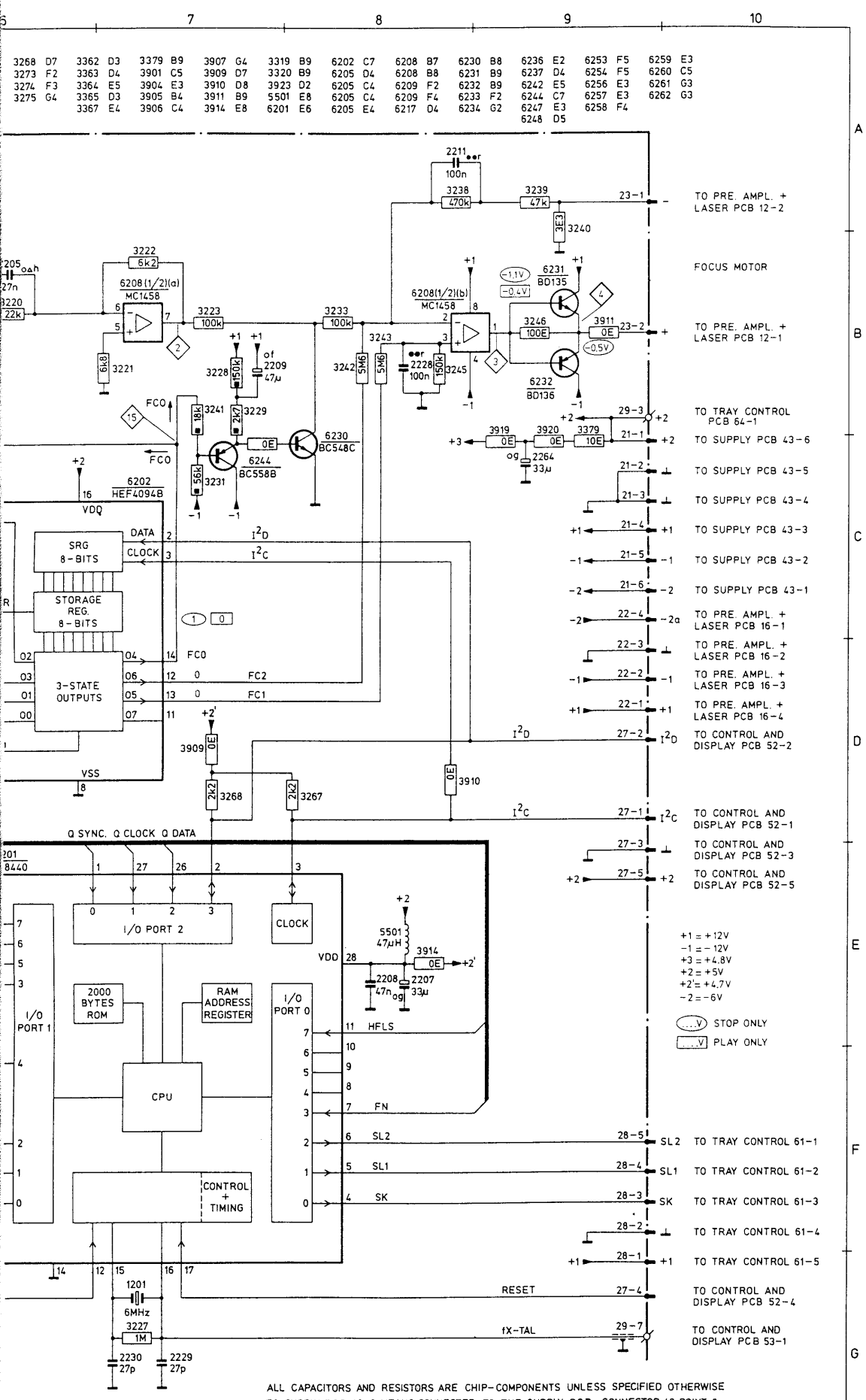
1051	C02	2051	C03	2056	A02	2061	C02	3055	A02	3060	D01	3065	B04
1070	B04	2052	C02	2057	D02	3051	C02	3056	B02	3061	B02	3066	A05
1071	D04	2053	C01	2058	B02	3052	A02	3057	B02	3062	B03	3067	A05
1072	D04	2054	A02	2059	A04	3053	A02	3058	B02	3063	B02	3068	B02
1073	D05	2055	D02	2060	A05	3054	A02	3059	B02	3064	B04	5051	C01
6051	C02	6056	B03	6061	D02	6066	B04						
6052	B01	6057	B02	6062	C04	6067	B05						
6053	C02	6058	B02	6063	C04								
6054	B02	6059	A02	6064	C04								
6055	A02	6060	B02	6065	C04								

1051	C02	2051	C03	2056	E02	2061	C02	3055	E02	3060	B01	3065	D04
1070	D04	2052	C02	2057	B02	3051	C02	3056	D02	3061	D03	3066	E05
1071	B04	2053	C01	2058	D02	3052	E02	3057	D02	3062	D03	3067	E05
1072	B04	2054	E02	2059	E04	3053	E02	3058	D02	3063	D02	3068	D02
1073	B05	2055	B02	2060	E05	3054	E02	3059	D02	3064	D04	5051	C01
6051	C02	6056	D03	6061	B02	6066	D04						
6052	D01	6057	D03	6062	C04	6067	D05						
6053	C02	6058	D02	6063	C04								
6054	D02	6059	E03	6064	C04								
6055	E02	6060	D02	6065	C04								

SERVO 1


1201 G7
2203 C5
2204 E4
2205 B6
2207 E8
2208 E8
2209 B8
2211 A8
2214 G5
2215 F3
2216 F2
2217 F2
2218 F4
2219 F4
2220 G3
2228 B8
2229 G7
2230 G7
3201 B3
3202 B4
3203 B3
3205 C3
3207 E2
3208 E2
3209 C3
3210 C3
3211 C4
3212 C4
3213 F4
3214 E3
3215 E4
3216 E4
3217 E4
3219 B6
3220 B6
3221 B7
3222 B7
3223 B7
3227 G7
3228 B7
3229 B7
3230 B7
3231 C7
3233 B8
3234 F6
3235 F6
3236 F6
3237 F6
3238 A8
3239 A9
3240 A9
3241 B7
3242 B8
3243 B8
3245 B8
3246 B9
3250 G4
3251 G4
3252 F2
3253 G3
3254 F3
3255 F3
3256 G2
3257 F2
3258 F3
3259 F4
3260 F4
3261 F5
3263 C5
3264 C6
3265 F6
3266 F6
3267 D8
3268 D7
3273 F2
3274 F3
3275 G4
3362
3363
3364
3365
3367
TO PRE. AMPL. + LASER PCB 17-1
TO PRE. AMPL. + LASER PCB 17-2
TO DECODER 1 34-4
TO DECODER 1 34-3
TO DECODER 1 34-2
TO DECODER 1 34-1
TO DECODER 1 33-5
TO DECODER 1 33-1
TO DECODER 1 33-2
TO DECODER 1 33-4
TO DECODER 1 33-3
TO TRAY CONTROL PCB 64-3
TO PRE. AMPL. +LASER PCB 14-2
TURNTABLE MOTOR
TO PRE. AMPL. +LASER PCB 14-1
TO TRAY CONTROL PCB 64-2
FOCUS ERROR
Q CLOCK
Q SYNC.
Q DATA
HFLS
PREEM
MUTE
MCES
SRDO
FN
FCO
RP
RE
RCO
RDIR
INT/TL
LM339
MC1458
MAB8440
BAT85
BC548B
BC558B
BC635
BC636
BAW62
BZV46 2V0
SRG 8-BITS
STORAGE REG. 8-BITS
3-STATE OUTPUTS
I/O PORT 1
DAC3
DAC2
DAC1
DAC0
VDD
VSS
STR
EO
T1
Q CLOCK
Q SYNC.
Q DATA
HFLS
FN

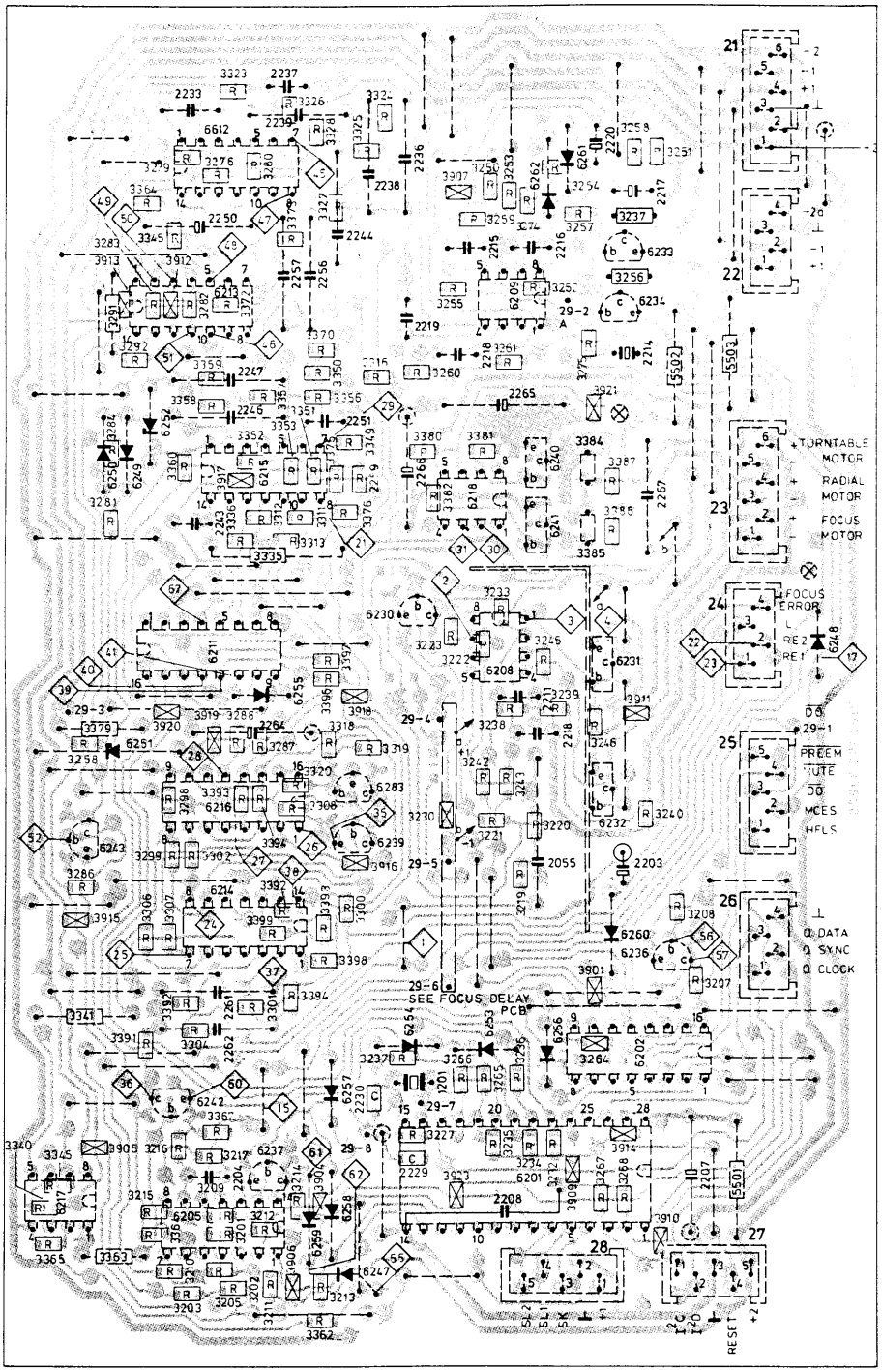

3 4 5 6 7 8 9
3210 C3 3211 C4 3212 C4 3213 F4 3214 E3
3215 E4 3216 E4 3217 E4 3219 B6 3220 B6
3221 B7 3222 B7 3223 B7 3227 G7 3228 B7 3229 B7
3230 B7 3231 C7 3233 B8 3234 F6 3235 F6 3236 E6
3237 F6 3238 A8 3239 A9 3240 A9 3241 B7 3242 B8
3243 B8 3245 B8 3246 B9 3250 G4 3251 G4
3252 F2 3253 G3 3254 F3 3255 F3 3256 G2
3257 F2 3258 F3 3259 F4 3260 F4 3261 F5
3263 C5 3264 C6 3265 F6 3266 F6 3267 D8
3268 D7 3273 F2 3274 F3 3275 G4
3362 D3 3363 D4 3364 E5 3365 D3 3367 E4
3379 B9 3901 C5 3904 E3 3905 B4 3906 C4
3907 G4 3909 D7 3910 B9 3911 B9 3914 E8
3319 B9 3320 B9 3923 D2 5501 E8 6201 E6
6202 C7 6205 D4 6205 C4 6205 E4
6208 B7 6208 B8 6209 F2 6209 F4 6217 D4
6230 B8 6231 B9 6232 B9 6233 F2 6234 G2
6236 E2 6237 D4 6242 E5 6244 C7 6247 E3 6248 D5
625 625 625 625 625
2205 27n
3222 6k2
6208(1/2)(a) MC1458
3219 2k2
3220 22k
3223 100k
3233 100k
2211 100n
3238 470k
3239 47k
3240 3E3
6208(1/2)(b) MC1458
6231 BD135
6232 BD136
3246 100E
3245 150k
2228 100n
3242 5M6
3243 5M6
3228 150k
2209 47µ
3221 6k8
3201 56k
3203 330k
3202 1M
3905 0E
6205 (1/4)(a) LM339
3209 24k
3205 130k
6205(1/4)(b) LM339
3211 22k
3906 0E
3210 56k
6205(1/4)(c) LM339
3212 47k
6237 BC548B
6248 BAT85
3241 18k
3229 2k7
6230 BC548C
6244 BC558B
3231 56k
2264 33µ
3919 0E
3920 0E
3379 10E
6260 BAT85
2203 10µ
3901 0E
3264 0E
6202 HEF4094B
VDD
SRG 8-BITS
STORAGE REG. 8-BITS
3-STATE OUTPUTS
DATA
CLOCK
STR
SRDO
PREEM
MUTE
EO
VSS
I²D
I²C
FC0
FC2
FC1
3909 0E
3910 0E
3268 2k2
3267 2k2
HFLS
6217 (1/2)(b) MC1458
3362 100k
3365 470k
3363 10k
6247 BAW62
3214 8k2
6205 (1/4)(d) LM339
6259 BAW62
6242 BC558B
3364 4k7
3216 100k
3215 6k8
2204 100n
3217 33k
3367 470k
Q SYNC. Q CLOCK Q DATA
Q CLOCK
Q SYNC.
Q DATA
HFLS
FN
6201 MAB8440
I/O PORT 2
CLOCK
I/O PORT 1
I/O PORT 0
2000 BYTES ROM
RAM ADDRESS REGISTER
CPU
CONTROL + TIMING
VDD
5501 47µH
3914 0E
2208 47n
2207 33µ
RCO
RDIR
µDAC
DAC3
DAC2
DAC1
DAC0
T1
RP
RESET
fX-TAL
6253 BAW62
3236 13k
3234 4k7
3237 91k
3235 10k
3265 150k
3266 360k
1201 6MHz
3227 1M
2230 27p
2229 27p
INT/TL
6258 BAW62
3213 68k
3255 7k5
2218 33n
2219 100n
3254 56k
3258 2k7
3259 5k6
3260 22k
3261 22k
MCES
3907 0E
2220 33µ
3253 5k1
3251 100k
3275 4k7
3250 100k
2214 4µ7
ALL CAPACITORS AND RESISTORS ARE CHIP-COMPONENTS UNLES
TO SUPPLY PCB 43-6 MEANS CONNECTED TO THE SUPPLY PCB
3 4 5 6 7 8 9


3268 D7 3273 F2 3274 F3 3275 G4
3362 D3 3363 D4 3364 E5 3365 D3 3367 E4
3379 B9 3901 C5 3904 E3 3905 B4 3906 C4
3907 G4 3909 D7 3910 D8 3911 B9 3914 E8
3319 B9 3320 B9 3923 D2 5501 E8 6201 E6
6202 C7 6205 D4 6205 C4 6205 C4 6205 E4
6208 B7 6208 B8 6209 F2 6209 F4 6217 D4
6230 B8 6231 B9 6232 B9 6233 F2 6234 G2
6236 E2 6237 D4 6242 E5 6244 C7 6247 E3 6248 D5
6253 F5 6254 F5 6256 E3 6257 E3 6258 F4
6259 E3 6260 C5 6261 G3 6262 G3
TO PRE. AMPL. + LASER PCB 12-2
FOCUS MOTOR
TO PRE. AMPL. + LASER PCB 12-1
TO TRAY CONTROL PCB 64-1
TO SUPPLY PCB 43-6
TO SUPPLY PCB 43-5
TO SUPPLY PCB 43-4
TO SUPPLY PCB 43-3
TO SUPPLY PCB 43-2
TO SUPPLY PCB 43-1
TO PRE. AMPL. + LASER PCB 16-1
TO PRE. AMPL. + LASER PCB 16-2
TO PRE. AMPL. + LASER PCB 16-3
TO PRE. AMPL. + LASER PCB 16-4
TO CONTROL AND DISPLAY PCB 52-2
TO CONTROL AND DISPLAY PCB 52-1
TO CONTROL AND DISPLAY PCB 52-3
TO CONTROL AND DISPLAY PCB 52-5
TO TRAY CONTROL 61-1
TO TRAY CONTROL 61-2
TO TRAY CONTROL 61-3
TO TRAY CONTROL 61-4
TO TRAY CONTROL 61-5
TO CONTROL AND DISPLAY PCB 52-4
TO CONTROL AND DISPLAY PCB 53-1
SRG 8-BITS
STORAGE REG. 8-BITS
3-STATE OUTPUTS
I/O PORT 2
I/O PORT 1
I/O PORT 0
2000 BYTES ROM
RAM ADDRESS REGISTER
CPU
CONTROL + TIMING
CLOCK
Q SYNC. Q CLOCK Q DATA
+1 = +12V
−1 = −12V
+3 = +4.8V
+2 = +5V
+2' = +4.7V
−2 = −6V
STOP ONLY
PLAY ONLY
ALL CAPACITORS AND RESISTORS ARE CHIP-COMPONENTS UNLESS SPECIFIED OTHERWISE
TO SUPPLY PCB 43-6 MEANS CONNECTED TO THE SUPPLY PCB CONNECTOR 43 POINT 6
35 680 E7

| | | |

SERVO P.C.B.

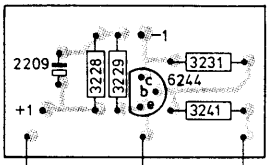
SERVO PCB



⊗ GRIPLET / COPPERTRACK CONNECTED TO THE COPPERFOIL ON THE COMPONENT SIDE OF THE PCB

⊙ ⊗ SOLDERED ON THE COPPERERFOIL (L)

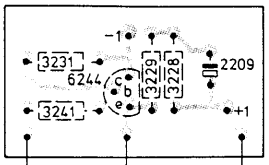
FOCUS DELAY P.C.B.



TO SERVO PCB 29-4 | TO SERVO PCB 29-5 | TO SERVO PCB 29-6

36 111A7

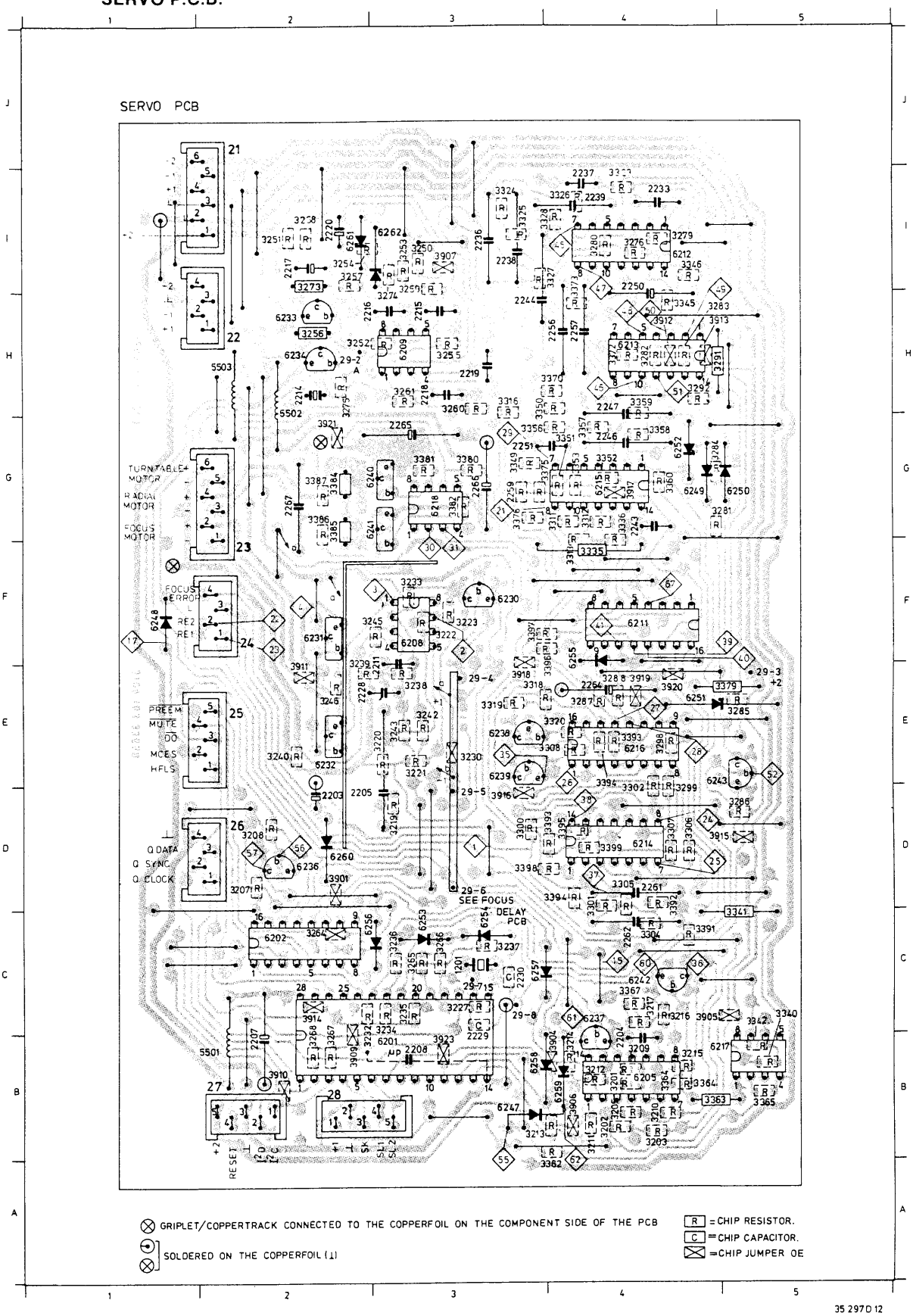
FOCUS DELAY P.C.B.



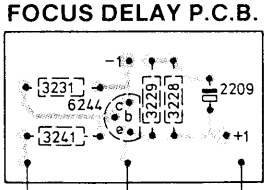
TO SERVO PCB 29-6 | TO SERVO PCB 29-5 | TO SERVO PCB 29-4

36 110A7

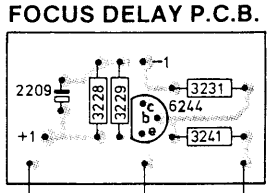
SERVO P.C.B.



FOCUS DELAY P.C.B.



FOCUS DELAY P.C.B.



1201	C3	2208	B3	2217	I2	2229	B3	2238	I3	2247	H4	2259	G3	2266	G3	3205	B4	3211	B4	3216	C4	3222	F3	3233	F3	3238	E3
2203	D2	2211	E3	2218	H3	2230	C3	2239	I4	2250	I4	2261	D4	2267	G2	3207	D2	3212	B4	3217	C4	3223	F3	3234	C3	3239	E2
2204	B4	2214	H2	2219	H3	2233	I4	2243	G4	2251	G3	2262	C4	3201	B4	3208	D2	3213	B3	3219	D3	3227	C3	3235	C3	3240	E2
2205	D2	2215	H3	2220	I2	2236	I3	2244	H3	2256	H4	2264	E4	3202	B4	3209	B4	3214	B4	3220	E3	3230	E3	3236	C3	3242	E3
2207	B2	2216	H2	2228	E2	2237	I4	2246	G4	2257	H4	2265	G3	3203	B4	3210	B4	3215	B4	3221	E3	3232	B2	3237	C3	3243	E3
3245	F3	3253	I3	3258	I2	3265	C3	3274	H3	3282	H4	3287	E4	3299	D4	3305	D4	3312	G4	3320	E4	3327	I4	3341	C5	3350	H3
3246	E2	3254	I2	3259	I3	3266	C3	3275	H2	3283	H4	3288	E4	3300	D3	3306	D4	3313	F4	3323	I4	3328	I4	3342	C5	3351	G4
3250	I3	3255	H3	3260	H3	3267	I4	3279	I4	3284	G4	3291	H4	3301	D4	3307	D4	3316	H3	3324	I3	3335	F4	3345	H4	3352	G4
3251	I2	3256	H2	3261	H3	3268	B2	3280	I4	3285	E5	3292	H4	3302	D4	3308	E4	3318	E3	3325	I3	3336	G4	3346	I4	3353	G4
3252	H2	3257	I2	3264	C2	3273	I2	3281	G5	3286	D5	3298	E4	3304	C4	3311	G4	3319	E3	3326	I4	3340	C5	3349	G3	3356	G3
3357	G4	3363	B4	3372	H4	3380	G3	3386	G2	3394	E4	3399	D4	3907	I3	3913	H4	3918	E3	5501	B2	6205	B4	6213	H4	6218	G3
3358	G4	3364	B4	3373	I4	3381	G3	3387	G2	3395	D4	3901	D2	3909	B2	3914	C2	3919	E4	5502	H2	6208	F3	6214	D4	6230	F3
3359	H4	3365	B5	3375	G4	3382	G3	3391	C4	3396	E4	3904	B4	3910	B2	3915	D5	3920	E4	5503	H2	6209	H3	6215	G4	6231	F2
3360	G4	3367	C4	3376	G3	3384	G2	3392	D4	3397	F3	3905	C4	3911	E2	3916	D3	3921	G2	6201	B3	6211	F4	6216	E4	6232	E2
3362	A4	3370	H4	3379	E5	3385	G2	3393	D4	3398	D3	3906	B4	3912	H4	3917	G4	3923	B3	6202	C2	6212	I4	6217	B5	6233	H2
6234	H2	6240	G3	6248	F1	6253	C3	6258	B3																		
6236	D2	6241	G3	6249	G4	6254	C3	6259	B4																		
6237	C4	6242	C4	6250	G5	6255	F4	6260	D2																		
6238	E3	6243	E5	6251	E4	6256	C2	6261	I2																		
6239	E3	6247	B3	6252	G4	6257	C3	6262	I3																		

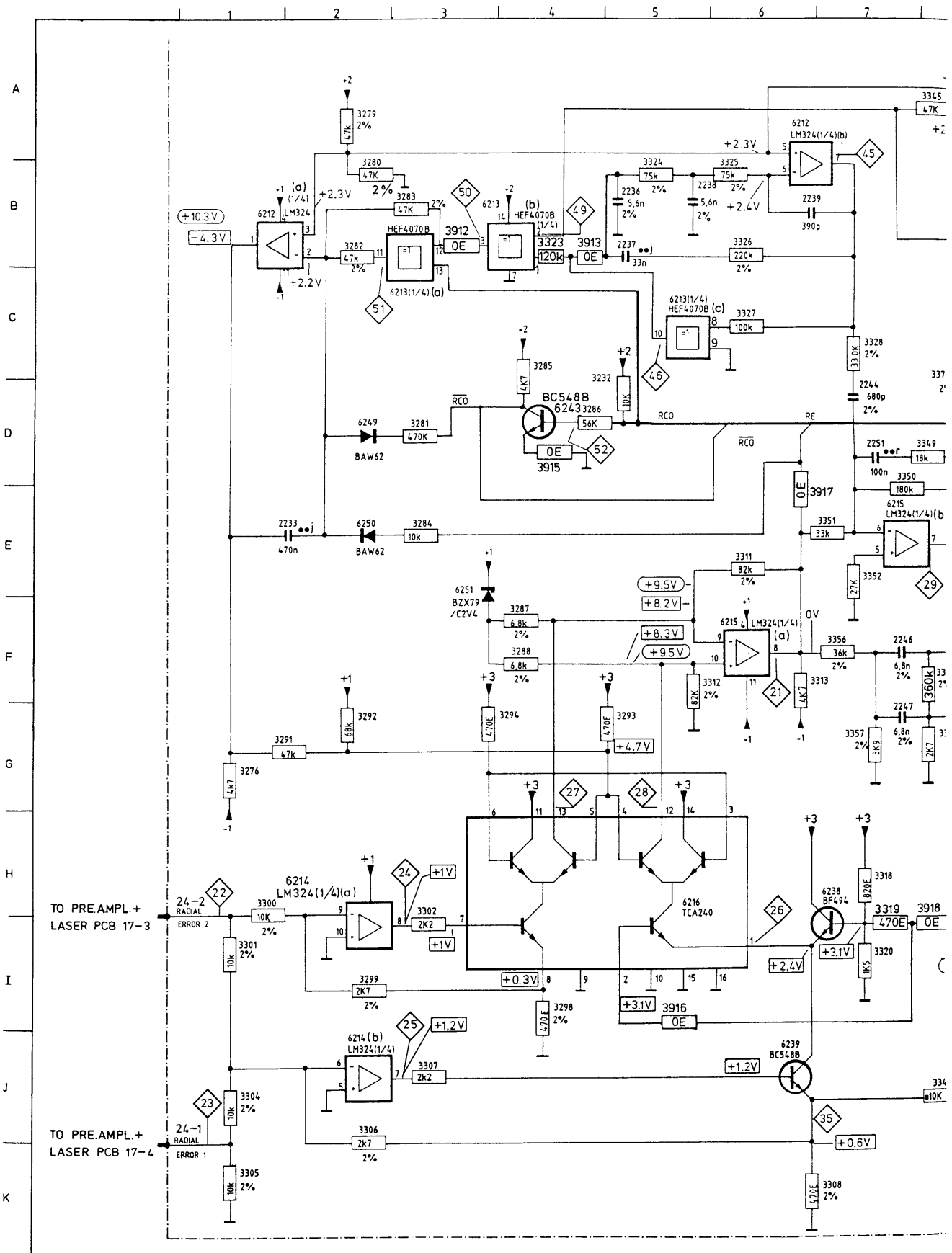
SERVO

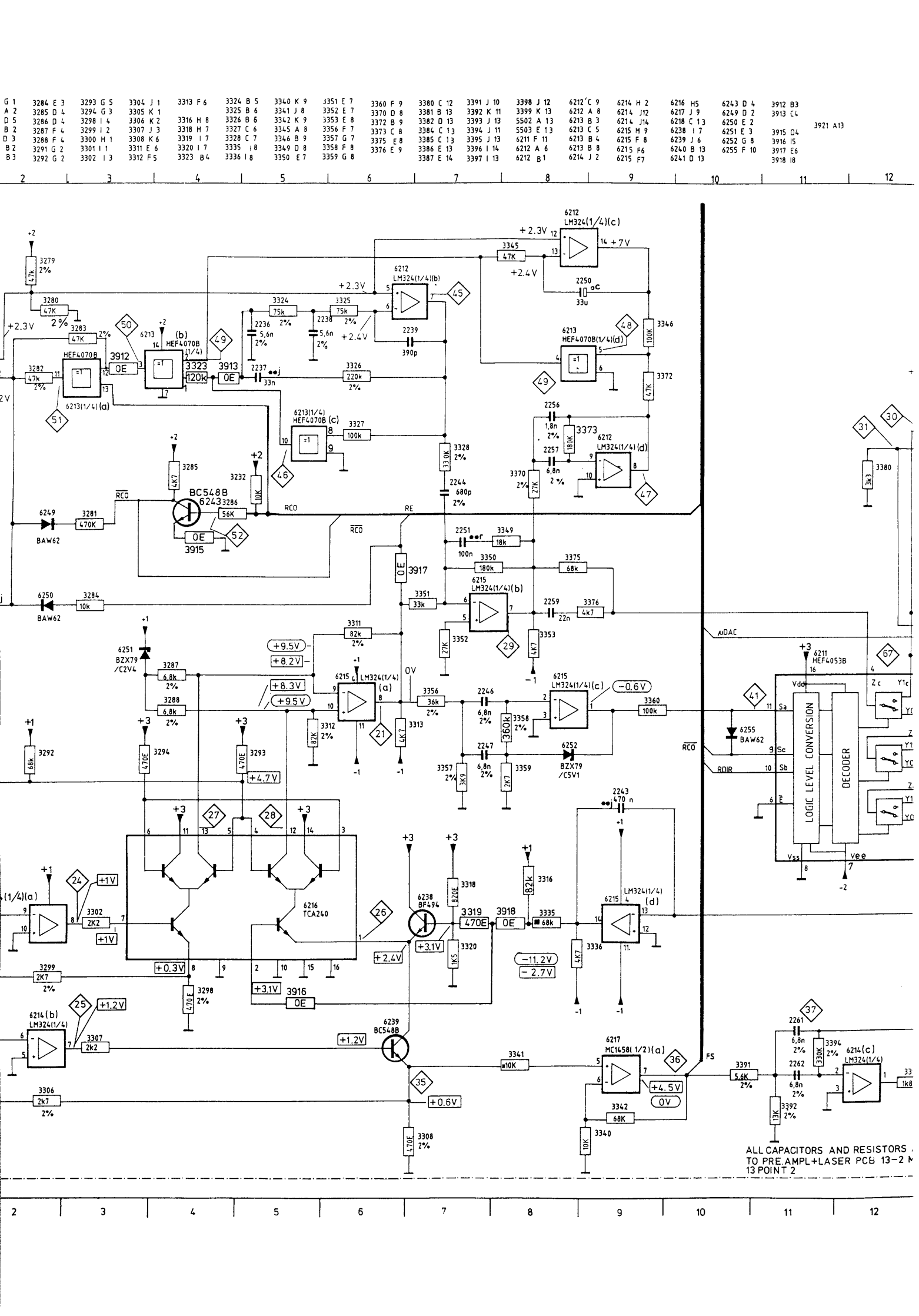
HEF4053BP		5322 209 14121
LM324N		4822 209 80587
HEF4070BP		4822 209 10265
TCA240		4822 209 80629
μA714CN		4822 209 80617
BC548B		4822 130 44196
BF494		4822 130 44195
BD135		4822 130 40823
BD136		4822 130 40824
BAW62		4822 130 30613
BZX79-C2V4		4822 130 31253
BZX79-C5V1		4822 130 34233
5502, 5503		4822 156 20966
2236, 2238	5,6 nF-63 V-2%	4822 121 50543
2239	390 pF-630V-2%	5322 121 54128
2244	680 pF-250 V-2%	5322 121 54174
2246,2247, 2257	6,8 nF-63 V-2%	4822 121 50538
2261,2262, 2256	1,8 nF-160 V-2%	5322 121 54087
2259	22 nF	4822 122 31797
3291	47k-SFR16	4822 116 52284
3384, 3385	PTC 9E4-60 V	4822 116 40031

0E	Chip jumper	4822 111 90163
2E2		4822 111 90507
3E3		4822 111 90447
4E7		5322 111 90376
100E		5322 111 90091
120E		4822 111 90403
470E		4822 111 90217
680E		4822 111 90162
820E		4822 111 90171
1k		5322 111 90171
1k5		4822 111 90151
1k8		5322 111 90101
2k2		4822 111 90248
2k7		4822 111 90179
3k3		4822 111 90188
3k9		4822 116 60156
4k7		5322 111 90111
5k1		5322 111 90268
5k6		5322 111 90114
6k2		4822 111 90545
6k8		4822 111 90544
7k5		5322 111 90276
8k2		5322 111 90118
10k		4822 111 90248
13k		4822 111 90509
15k		4822 111 90196
18k		4822 111 90238
22k		4822 111 90251
24k		4822 111 90512
27k		4822 111 90155
33k		5322 111 90267
36k		4822 111 90514
47k		4822 111 90543
56k		5322 111 90115
68k		4822 111 90202
75k		4822 111 90542
82k		4822 116 60185
91k		5322 111 90277
100k		4822 111 90214
120k		4822 111 90149
130k		4822 111 90511
150k		4822 116 60166
180k		5322 111 90273
220k		4822 111 90197
330k		4822 111 90513
360k		4822 111 90515
470k		4822 111 90161
1M		4822 111 90252
5M6		4822 111 90508

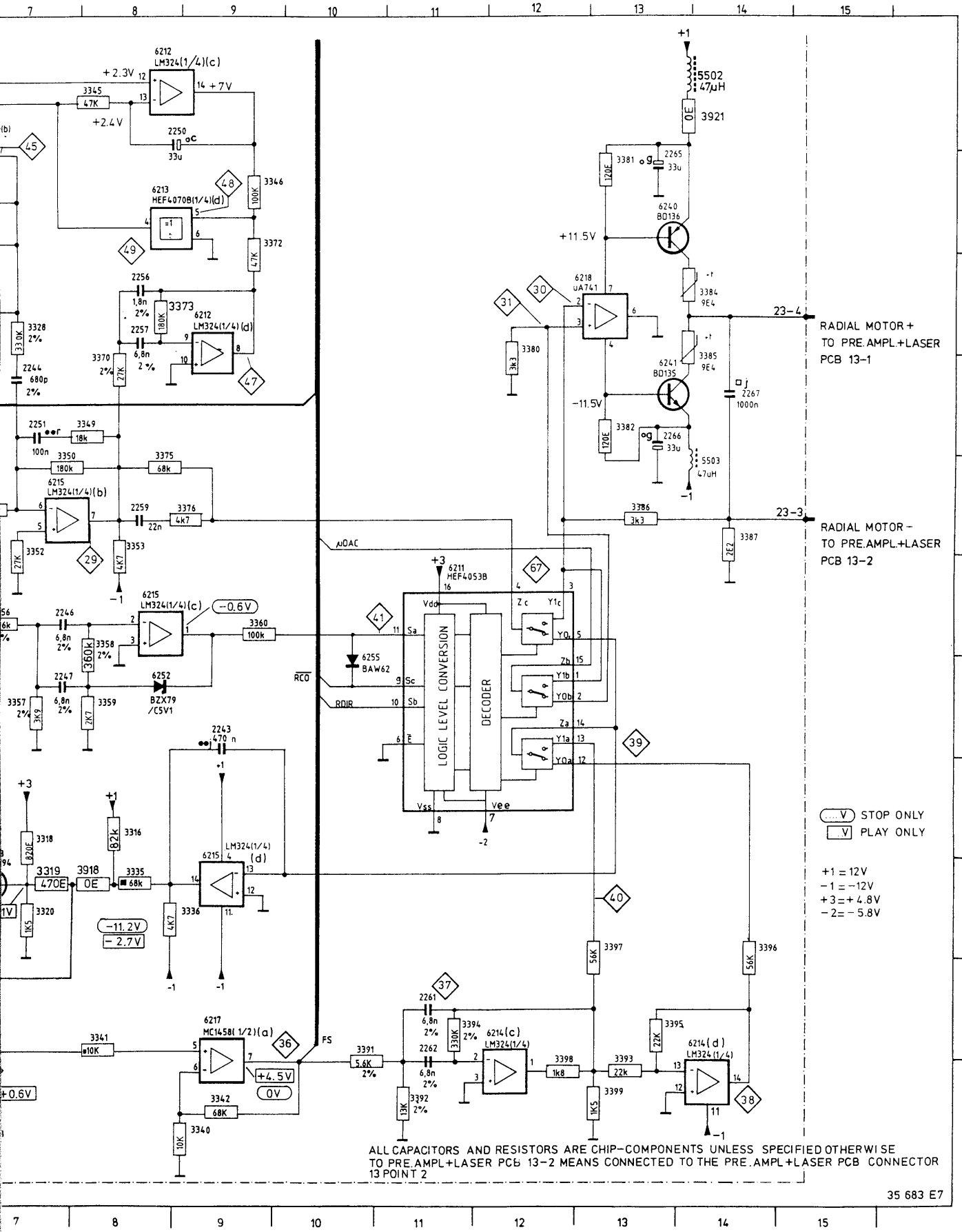
SERVO 2

2233 E 2	2246 F 7	2261 J11	3276 G 1	3284 E 3	3293 G 5	3304 J 1	3313 F 6	3324 B 5	3340 K 9	3351 E 7	3360 F 9	3380 C 12	3391 J 10	33
2236 B 5	2247 G 7	2262 J11	3279 A 2	3285 D 4	3294 G 3	3305 K 1		3325 B 6	3341 J 8	3352 E 7	3370 D 8	3381 B 13	3392 K 11	33
2237 B 5	2250 A 8		3232 D 5	3286 D 4	3298 I 4	3306 K 2	3316 H 8	3326 B 6	3342 K 9	3353 E 8	3372 B 9	3382 D 13	3393 J 13	55
2238 B 5	2251 D 7	2265 B13	3280 B 2	3287 F 4	3299 I 2	3307 J 3	3318 H 7	3327 C 6	3345 A 8	3356 F 7	3373 C 8	3384 C 13	3394 J 11	55
2239 B 6	2256 C 8	2266 D13	3281 D 3	3288 F 4	3300 H 1	3308 K 6	3319 I 7	3328 C 7	3346 B 9	3357 G 7	3375 E 8	3385 C 13	3395 J 13	62
2243 G 9	2257 C 8		3282 B 2	3291 G 2	3301 I 3	3311 E 6	3320 I 7	3335 I 8	3349 D 8	3358 F 8	3376 E 9	3386 E 13	3396 I 14	62
2244 D 7	2259 E 8		3283 B 3	3292 G 2	3302 I 3	3312 F 5	3323 B 4	3336 I 8	3350 E 7	3359 G 8		3387 E 14	3397 I 13	62

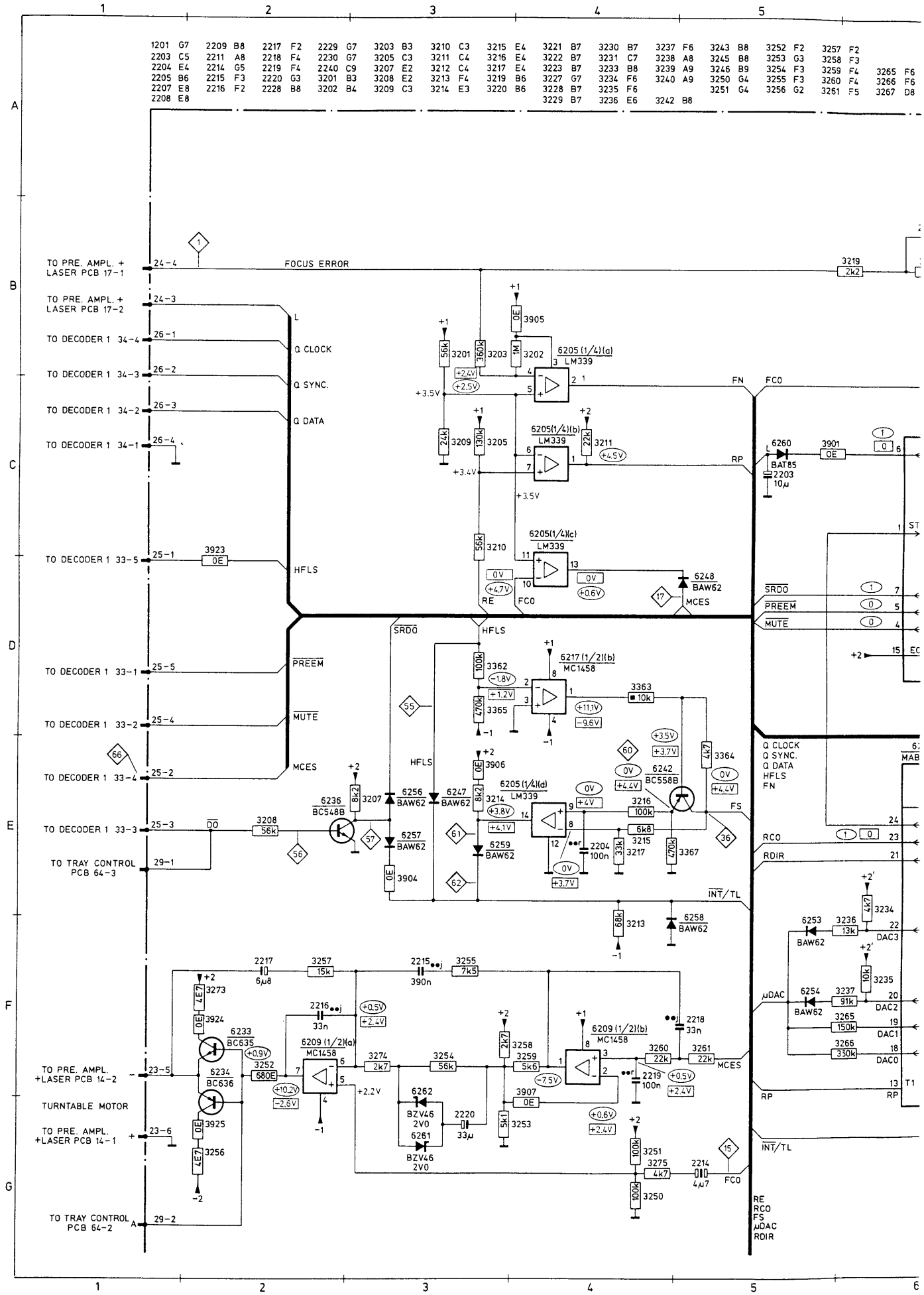



3921 A13
ALL CAPACITORS AND RESISTORS
TO PRE.AMPL+LASER PCB 13-2
13 POINT 2
LOGIC LEVEL CONVERSION
DECODER
HEF4053B
LM324(1/4)
HEF4070B
BC548B
BC548B
BF494
TCA240
MC1458(1/2)(a)
BZX79 /C5V1
BZX79 /C2V4
BAW62
+2.3V
+2.4V
+7V
+1.2V
+0.6V
+0.3V
+3.1V
+4.5V
+4.7V
+9.5V
+8.2V
+8.3V
-11.2V
-2.7V
-0.6V
RCO
RE
FS
RDIR
µDAC

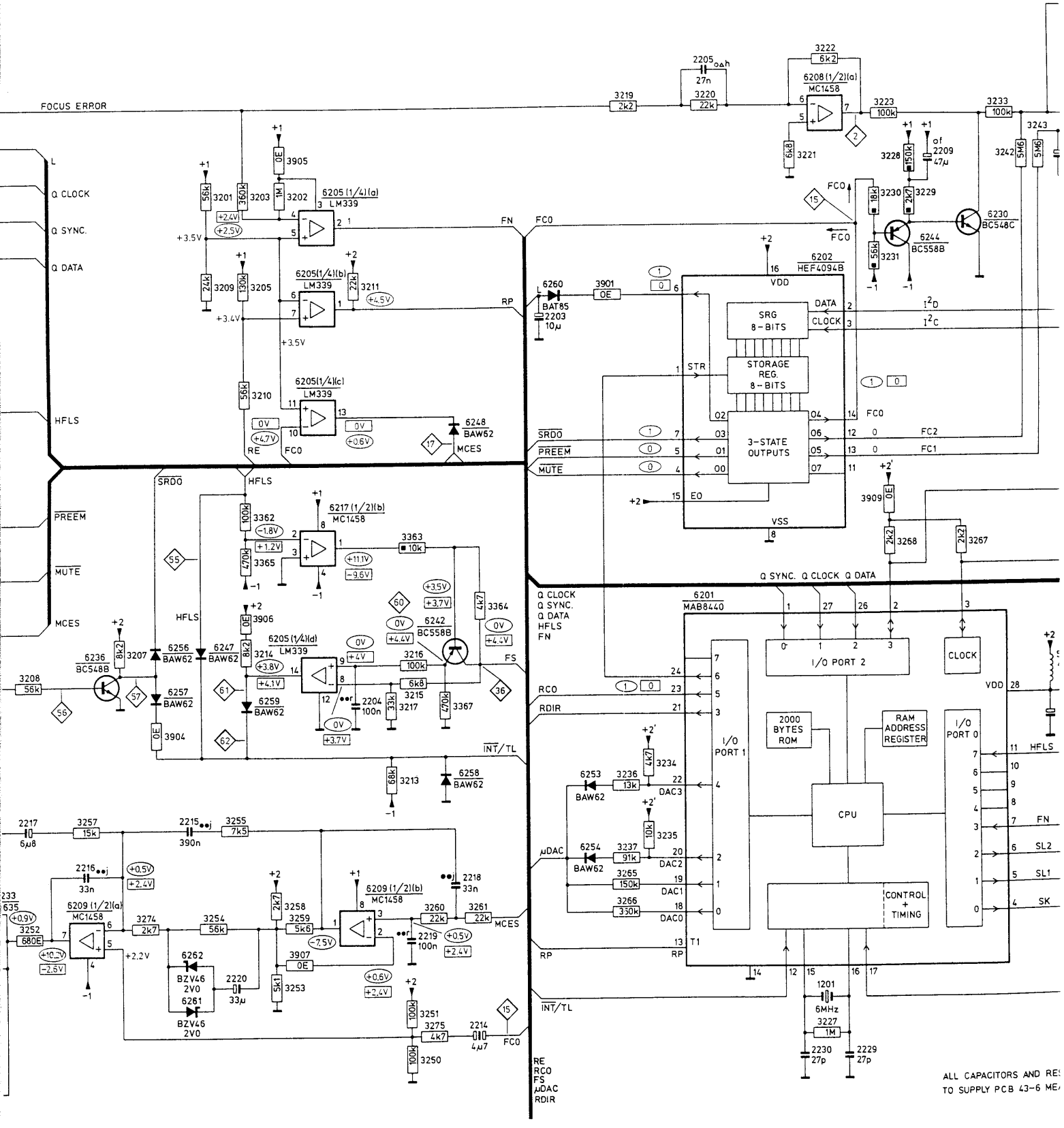
0 C 12 3391 J 10 3398 J 12 6212'C 9 6214 H 2 6216 H5 6243 D 4 3912 B3
1 B 13 3392 K 11 3399 K 13 6212 A 8 6214 J12 6217 J 9 6249 D 2 3913 C4
2 D 13 3393 J 13 5502 A 13 6213 B 3 6214 J14 6218 C 13 6250 E 2
4 C 13 3394 J 11 5503 E 13 6213 C 5 6215 H 9 6238 I 7 6251 E 3 3915 D4
5 C 13 3395 J 13 6211 F 11 6213 B 4 6215 F 8 6239 J 6 6252 G 8 3916 I5
6 E 13 3396 I 14 6212 A 6 6213 B 8 6215 F6 6240 B 13 6255 F 10 3917 E6
7 E 14 3397 I 13 6212 B1 6214 J 2 6215 F7 6241 D 13 3918 I8
3921 A13

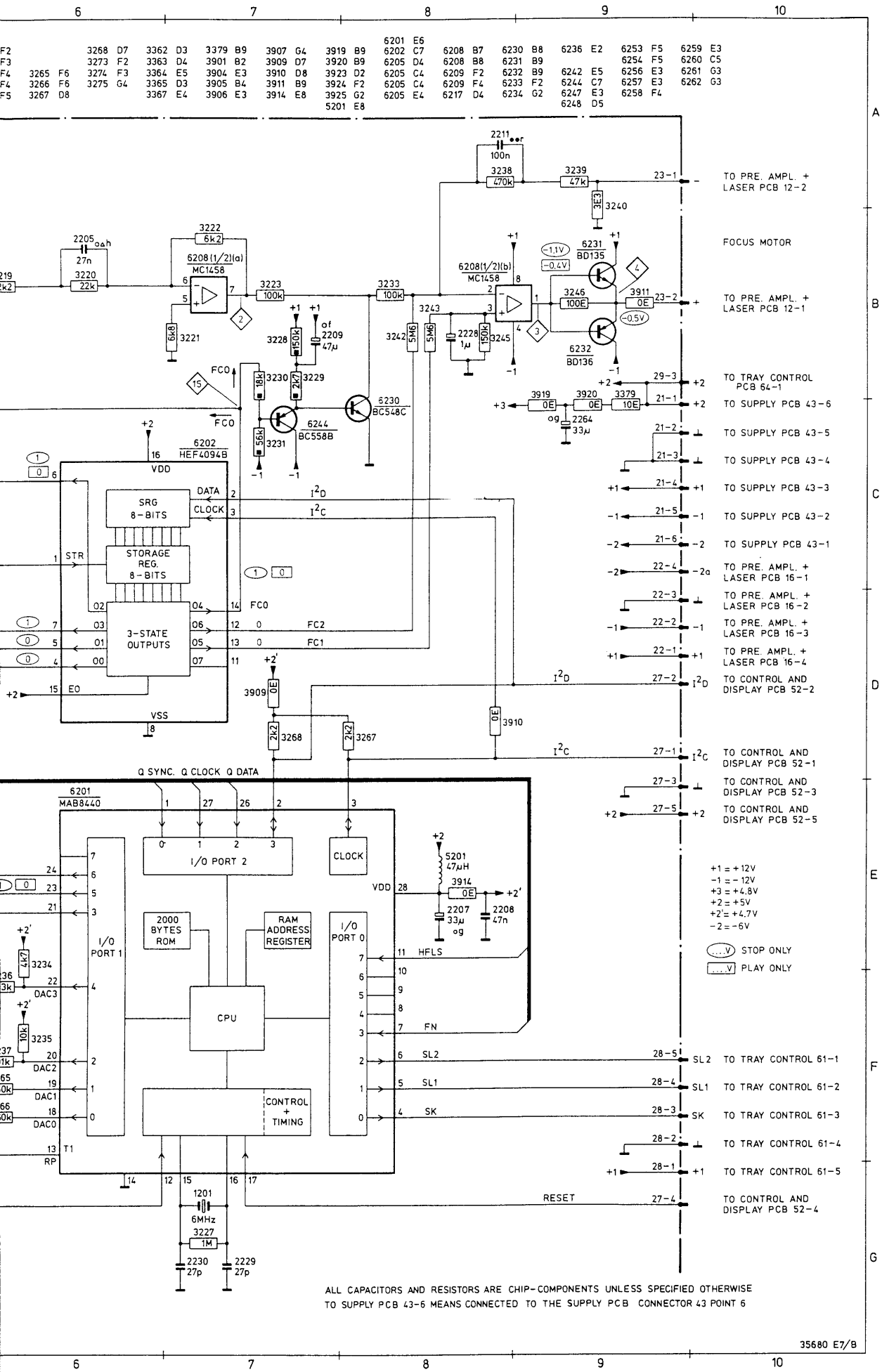


SERVO 1


TO PRE. AMPL. + LASER PCB 17-1
TO PRE. AMPL. + LASER PCB 17-2
TO DECODER 1 34-4
TO DECODER 1 34-3
TO DECODER 1 34-2
TO DECODER 1 34-1
TO DECODER 1 33-5
TO DECODER 1 33-1
TO DECODER 1 33-2
TO DECODER 1 33-4
TO DECODER 1 33-3
TO TRAY CONTROL PCB 64-3
TO PRE. AMPL. +LASER PCB 14-2
TURNTABLE MOTOR
TO PRE. AMPL. +LASER PCB 14-1
TO TRAY CONTROL PCB 64-2
FOCUS ERROR
Q CLOCK
Q SYNC.
Q DATA
HFLS
PREEM
MUTE
MCES
SRDO
FN
RP
RE
FCO
INT/TL
RCO
RDIR
µDAC
FS
LM339
MC1458
BAT85
BAW62
BC548B
BC635
BC636
BC558B
BZV46 2V0

2217 F2 2218 F4 2219 F4 2220 G3 2228 B8
2229 G7 2230 G7 2240 C9 3201 B3 3202 B4
3203 B3 3205 C3 3207 E2 3208 E2 3209 C3
3210 C3 3211 C4 3212 C4 3213 F4 3214 E3
3215 E4 3216 E4 3217 E4 3219 B6 3220 B6
3221 B7 3222 B7 3223 B7 3227 G7 3228 B7 3229 B7
3230 B7 3231 C7 3233 B8 3234 F6 3235 F6 3236 E6
3237 F6 3238 A8 3239 A9 3240 A9 3242 B8
3243 B8 3245 B8 3246 B9 3250 G4 3251 G4
3252 F2 3253 G3 3254 F3 3255 F3 3256 G2
3257 F2 3258 F3 3259 F4 3260 F4 3261 F5
3265 F6 3266 F6 3267 D8
3268 D7 3273 F2 3274 F3 3275 G4
3362 D3 3363 D4 3364 E5 3365 D3 3367 E4
3379 B9 3901 B2 3904 E3 3905 B4 3906 E3
3907 G4 3909 D7 3910 D8 3911 B9 3914 E8
3919 B9 3920 B9 3923 D2 3924 F2 3925 G2 5201 E8
6201 E6
6202 C7 6205 D4 6205 C4 6205 C4 6205 E4
62




6 7 8 9 10
F2 3268 D7 3362 D3 3379 B9 3907 G4 3919 B9 6201 E6 6208 B7 6230 B8 6236 E2 6253 F5 6259 E3
F3 3273 F2 3363 D4 3901 B2 3909 D7 3920 B9 6202 C7 6231 B8 6254 F5 6260 C5
F4 3265 F6 3274 F3 3364 E5 3904 E3 3910 D8 3923 D2 6205 D4 6232 B9 6256 E3 6261 G3
F4 3266 F6 3275 G4 3365 D3 3905 B4 3911 B9 3924 F2 6205 C4 6233 F2 6242 E5 6257 E3 6262 G3
F5 3267 D8 3367 E4 3906 E3 3914 E8 3925 G2 6205 C4 6234 G2 6244 C7 6258 F4
5201 E8 6205 E4 6217 D4 6247 E3
6248 D5
A
B
C
D
E
F
G
2211 100n
3238 470k
3239 47k
23-1
TO PRE. AMPL. + LASER PCB 12-2
3E3 3240
FOCUS MOTOR
2205 27n
3220 22k
3222 6k2
6208(1/2)(a) MC1458
3223 100k
3233 100k
6208(1/2)(b) MC1458
6231 BD135
6232 BD136
3246 100E
3911 0E
23-2
TO PRE. AMPL. + LASER PCB 12-1
3221 6k8
3228 150k
2209 47µ
3242 5M6
3243 5M6
2228 1µ
3245 150k
FCO
3230 18k
3229 2k7
6230 BC548C
6244 BC558B
3231 56k
29-3
TO TRAY CONTROL PCB 64-1
3919 0E
3920 0E
3379 10E
2264 33µ
21-1
TO SUPPLY PCB 43-6
21-2
TO SUPPLY PCB 43-5
21-3
TO SUPPLY PCB 43-4
21-4
TO SUPPLY PCB 43-3
21-5
TO SUPPLY PCB 43-2
21-6
TO SUPPLY PCB 43-1
22-4
TO PRE. AMPL. + LASER PCB 16-1
22-3
TO PRE. AMPL. + LASER PCB 16-2
22-2
TO PRE. AMPL. + LASER PCB 16-3
22-1
TO PRE. AMPL. + LASER PCB 16-4
6202 HEF4094B
VDD
SRG 8-BITS
STORAGE REG. 8-BITS
3-STATE OUTPUTS
DATA
CLOCK
STR
EO
VSS
FC0
FC2
FC1
I²D
I²C
3909 0E
3910 0E
2k2 3268
2k2 3267
27-2
TO CONTROL AND DISPLAY PCB 52-2
27-1
TO CONTROL AND DISPLAY PCB 52-1
27-3
TO CONTROL AND DISPLAY PCB 52-3
27-5
TO CONTROL AND DISPLAY PCB 52-5
Q SYNC. Q CLOCK Q DATA
6201 MAB8440
I/O PORT 2
CLOCK
I/O PORT 1
I/O PORT 0
2000 BYTES ROM
RAM ADDRESS REGISTER
CPU
CONTROL + TIMING
5201 47µH
3914 0E
2207 33µ
2208 47n
HFLS
FN
SL2
SL1
SK
DAC3
DAC2
DAC1
DAC0
T1
RP
3234 4k7
3235 10k
28-5
TO TRAY CONTROL 61-1
28-4
TO TRAY CONTROL 61-2
28-3
TO TRAY CONTROL 61-3
28-2
TO TRAY CONTROL 61-4
28-1
TO TRAY CONTROL 61-5
RESET
27-4
TO CONTROL AND DISPLAY PCB 52-4
1201 6MHz
3227 1M
2230 27p
2229 27p
+1 = +12V
-1 = -12V
+3 = +4,8V
+2 = +5V
+2' = +4,7V
-2 = -6V
...V STOP ONLY
...V PLAY ONLY
ALL CAPACITORS AND RESISTORS ARE CHIP-COMPONENTS UNLESS SPECIFIED OTHERWISE
TO SUPPLY PCB 43-6 MEANS CONNECTED TO THE SUPPLY PCB CONNECTOR 43 POINT 6
35680 E7/8

1201	C03	2208	B03	2216	H03	2228	F02	2237	I04	2246	G04	2257	H04	2265	G03	3203	B04	3210	B04	3216	C04	3222	E03	3230	D03	3235	C03
2203	D01	2209	E03	2217	I02	2229	C03	2238	I03	2247	H04	2259	G03	2266	G03	3205	B04	3211	B04	3217	C04	3223	E03	3231	E03	3236	C03
2204	B04	2211	E03	2218	H03	2230	C03	2239	I04	2250	H04	2261	D04	2267	G02	3207	D01	3213	B03	3219	D03	3227	C03	3232	B02	3237	C03
2205	F02	2214	H02	2219	H03	2233	I04	2243	G04	2251	G03	2262	C04	3201	B04	3208	D01	3214	B04	3220	F02	3228	F03	3233	E03	3238	F03
2207	C02	2215	H03	2220	I02	2236	I03	2244	H03	2256	H03	2264	F04	3202	B04	3209	B04	3215	B04	3221	F03	3229	F03	3234	B03	3239	F02
3240	F02	3250	I03	3255	H03	3260	H03	3268	B02	3279	I04	3284	G04	3291	H04	3299	D04	3305	C04	3312	G04	3320	F04	3327	I04	3341	C05
3242	F03	3251	I02	3256	I02	3261	H03	3273	I02	3280	I04	3285	F05	3292	H04	3300	D03	3306	D04	3313	E04	3323	I04	3328	I03	3342	C05
3243	F03	3252	H02	3257	H02	3265	C03	3274	H03	3281	G04	3286	D05	3293	F04	3301	C04	3307	D04	3316	H03	3324	I03	3335	E04	3345	H04
3245	E02	3253	I03	3258	I02	3266	C03	3275	H02	3282	H04	3287	F04	3294	F04	3302	D04	3308	F04	3318	F03	3325	I03	3336	G04	3346	I04
3246	F02	3254	I02	3259	H03	3267	B02	3276	I04	3283	H04	3288	F04	3298	F04	3304	C04	3311	G04	3319	F03	3326	I04	3340	C05	3349	G03
3350	G03	3357	G04	3363	B04	3372	H04	3380	G03	3386	G02	3394	D04	3399	D04	3907	I03	3913	H04	3918	F03	3924	I02	6201	B03	6211	E04
3351	G04	3358	G04	3364	B04	3373	H04	3381	G03	3387	G02	3395	D04	3901	D01	3909	B02	3914	C02	3919	F04	3925	H02	6202	C02	6212	I04
3352	G04	3359	H04	3365	B05	3375	G03	3382	G03	3391	C04	3396	F04	3904	B04	3910	B02	3915	D04	3920	F04	5201	B02	6205	B04	6213	H04
3353	G04	3360	G04	3367	C04	3376	G03	3384	G02	3392	C04	3397	E03	3905	C04	3911	F02	3916	D03	3921	G02	5202	H02	6208	E03	6214	D04
3356	G03	3362	A04	3370	H04	3379	F05	3385	E02	3393	D04	3398	D03	3906	B04	3912	H04	3917	G04	3923	B03	5203	H02	6209	H03	6215	G04
6216	F04	6232	F02	6239	F03	6244	E03	6251	F04	6256	C03	6261	I02														
6217	B05	6233	H02	6240	G03	6247	B03	6252	G04	6257	C03	6262	I03														
6218	G03	6234	H02	6241	G02	6248	E01	6253	C03	6258	B03																
6230	E03	6236	D01	6242	C04	6249	G04	6254	C03	6259	B04																
6231	E02	6238	F03	6243	F04	6250	G05	6255	E04	6260	D01																

SERVO

MAB8440P/D041	µP	4822 209 10916
HEF4094B		5322 209 14485
LM339N		4822 209 80631
MC1458N		4822 209 81349
BC548C		4822 130 44196
BD135		4822 130 40823
BD136		4822 130 40824
BC635		5322 130 44349
BC636		4822 130 44283
BC558B		4822 130 44197
BAW62		4822 130 30613
BZV46-2V0		4822 130 31248
1201	6 MHz	4822 242 70392
5201	47 mH	4822 156 20966
2203	10 µF-10 V	5322 124 14066
2208	47 nF-50 V	4822 122 10288
2214	4,7 µF-35 V bip	4822 124 21292
2217	6,8 µF-16 V	4822 124 21538
2220	33 µF-10 V	4822 124 20945
2228	1 µF-25 V	4822 124 21457
2229,2230	27 pF	4822 122 31966

IC

28p		4822 255 40156

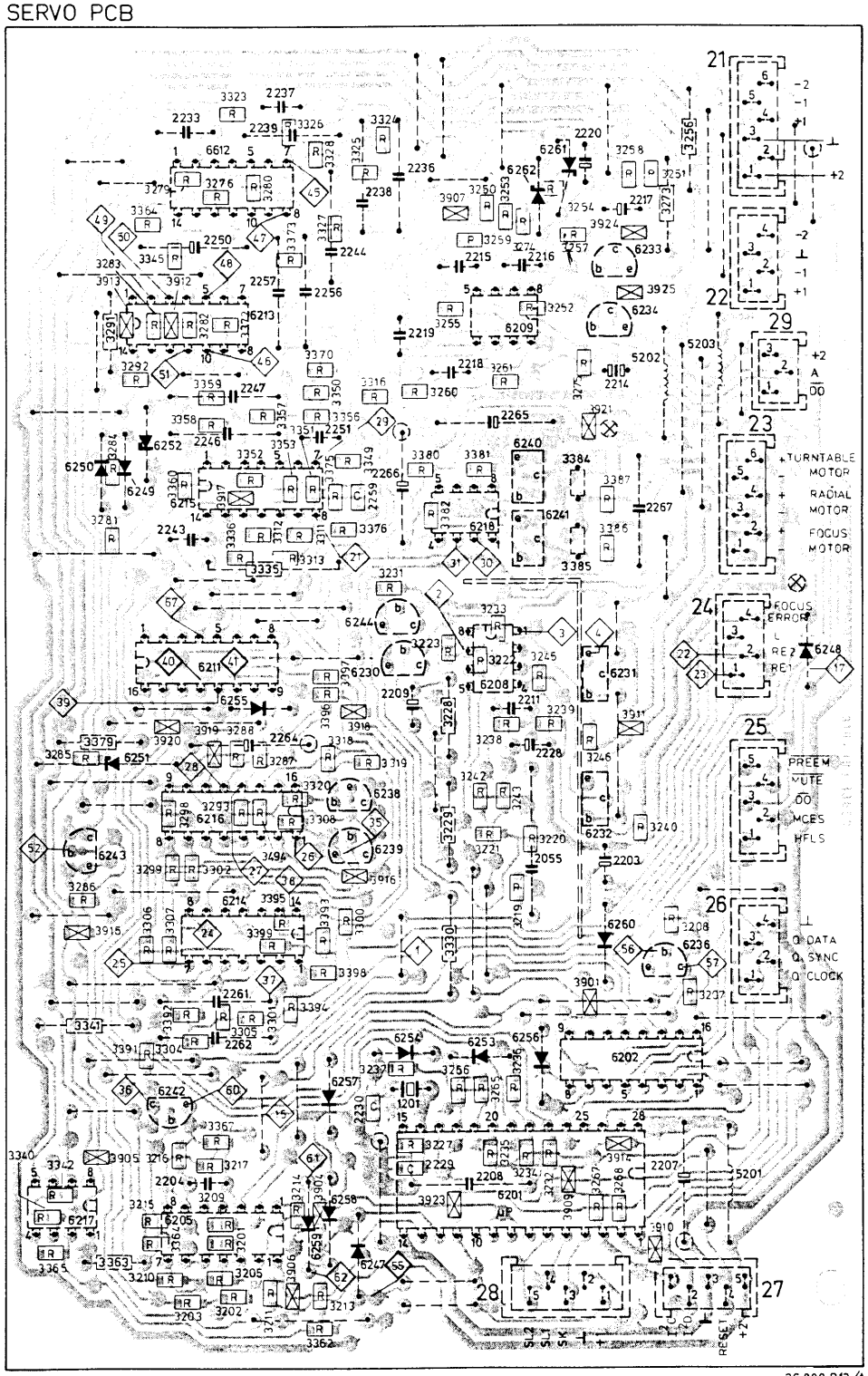
Miscellaneous

Mica washer for 6231/6232		4822 255 40133
Spring clip for 6231/6232		4822 255 40128

0E	chip jumper	4822 111 90163
2E2		4822 111 90507
3E3		4822 111 90447
4E7		5322 111 90376
100E		5322 111 90091
120E		4822 111 90403
470E		4822 111 90217
680E		4822 111 90162
820E		4822 111 90171
1k		5322 111 90092
1k5		4822 111 90151
1k8		5322 111 90101
2k2		4822 111 90248
2k7		4822 111 90179
3k3		4822 111 90188
3k9		4822 116 60156
4k7		5322 111 90111
5k1		5322 111 90268
5k6		5322 111 90114
6k2		4822 111 90545
6k8		4822 111 90544
7k5		5322 111 90276
8k2		5322 111 90118
10k		4822 111 90248
13k		4822 111 90509
15k		4822 111 90196
18k		4822 111 90238
22k		4822 111 90251
24k		4822 111 90512
27k		4822 111 90155
33k		5322 111 90267
36k		4822 111 90514
47k		4822 111 90543
56k		5322 111 90115
68k		4822 111 90202
75k		4822 111 90542
82k		4822 116 60185
91k		5322 111 90277
100k		4822 111 90214
120k		4822 111 90149
130k		4822 111 90511
150k		4822 116 60166
180k		5322 111 90273
220k		4822 111 90197
330k		4822 111 90513
360k		4822 111 90515
470k		4822 111 90161
1M		4822 111 90252
5M6		4822 111 90508
3256,3273	4,7 Ω fuse res.	4822 111 50483

SERVO PCB

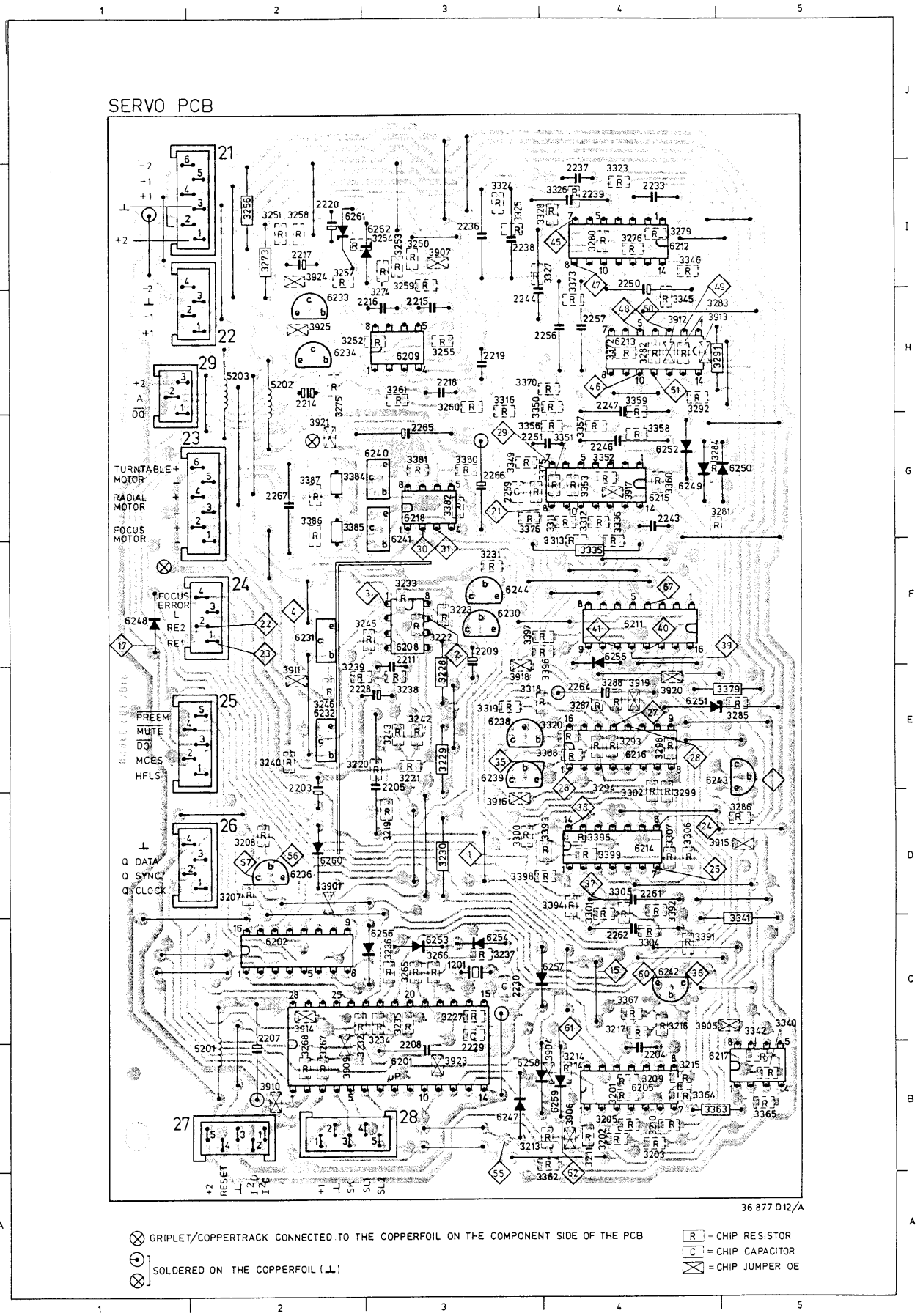
SERVO PCB



⊗ GRIPLET/COPPERTRACK CONNECTED TO THE COPPERFOIL ON THE COMPONENT SIDE OF THE PCB

⊙ ⊗] SOLDERED ON THE COPPERFOIL (⊥)

SERVO P.C.B.


SERVO PCB
TURNTABLE MOTOR
RADIAL MOTOR
FOCUS MOTOR
FOCUS ERROR
RE2
RE1
PREEM
MUTE
DO
MCES
HFLS
Q DATA
Q SYNC
Q CLOCK
RESET
SK
SL1
SL2
36 877 D12/A
⊗ GRIPLET/COPPERTRACK CONNECTED TO THE COPPERFOIL ON THE COMPONENT SIDE OF THE PCB
SOLDERED ON THE COPPERFOIL (⊥)
R = CHIP RESISTOR
C = CHIP CAPACITOR
= CHIP JUMPER OE

1201	C03	2208	B03	2216	H03	2228	E02	2237	I04	2246	G04	2257	H04	2265	G03	3203	B04	3210	B04
2203	E02	2209	F03	2217	I02	2229	B03	2238	I03	2247	H04	2259	G03	2266	G03	3205	B04	3211	B04
2204	B04	2211	F03	2218	H03	2230	C03	2239	I04	2250	I04	2261	D04	2267	G02	3207	D02	3213	B03
2205	E03	2214	H02	2219	H03	2233	I04	2243	G04	2251	G03	2262	C04	3201	B04	3208	D02	3214	B04
2207	C02	2215	H03	2220	I02	2236	I03	2244	H03	2256	H04	2264	E04	3202	B04	3209	B04	3215	B04
3216	C04	3222	F03	3230	D03	3235	C03	3240	E02	3250	I03	3255	H03	3260	H03	3268	B02	3279	I04
3217	C04	3223	F03	3231	F03	3236	C03	3242	E03	3251	I02	3256	I02	3261	H03	3273	I02	3280	I04
3219	D03	3227	C03	3232	B02	3237	C03	3243	E03	3252	H02	3257	I02	3265	C03	3274	H03	3281	G04
3220	E02	3228	E03	3233	F03	3238	E03	3245	F02	3253	I03	3258	B02	3266	C03	3275	H02	3282	H04
3221	E03	3229	E03	3234	C03	3239	E02	3246	E02	3254	I03	3259	I03	3267	B02	3276	I04	3283	H04
3284	G04	3291	H04	3299	D04	3305	D04	3312	G04	3320	E04	3327	I04	3341	C05	3350	H03	3357	G04
3285	E05	3292	H04	3300	D03	3306	D04	3313	F04	3323	I04	3328	I03	3342	C05	3351	G04	3358	G04
3286	D05	3293	E04	3301	D04	3307	D04	3316	H03	3324	I03	3335	F04	3345	H04	3352	G04	3359	H04
3287	E04	3294	E04	3302	D04	3308	E03	3318	E03	3325	I03	3336	G04	3346	I04	3353	G04	3360	G04
3288	E04	3298	E04	3304	C04	3311	G04	3319	E03	3326	I04	3340	C05	3349	G03	3356	G03	3362	B03
3363	B04	3372	H04	3380	G03	3386	G02	3394	D04	3399	D04	3907	I03	3913	H04	3918	E03	3924	I02
3364	B04	3373	I04	3381	G03	3387	G02	3395	D04	3901	D02	3909	B02	3914	C02	3919	E04	3925	H02
3365	B05	3375	G03	3382	G03	3391	C04	3396	E03	3904	B04	3910	B02	3915	D04	3920	E04	5201	B02
3367	C04	3376	G03	3384	G02	3392	D04	3397	F03	3905	C04	3911	E02	3916	D03	3921	G02	5202	H02
3370	H03	3379	E05	3385	G02	3393	D03	3398	D03	3906	B04	3912	H04	3917	G04	3923	B03	5203	H02
6201	B03	6211	F04	6216	E04	6232	E02	6239	E03	6244	F03	6251	E04	6256	C03	6261	I02		
6202	C02	6212	I04	6217	B04	6233	H02	6240	G03	6247	B03	6252	G04	6257	C04	6262	I03		
6205	B04	6213	H04	6218	G03	6234	H02	6241	F03	6248	F01	6253	C03	6258	B03				
6208	F03	6214	D04	6230	F03	6236	D02	6242	C04	6249	G04	6254	C03	6259	B04				
6209	H03	6215	G04	6231	F02	6238	E03	6243	E04	6250	G05	6255	F04	6260	D02				

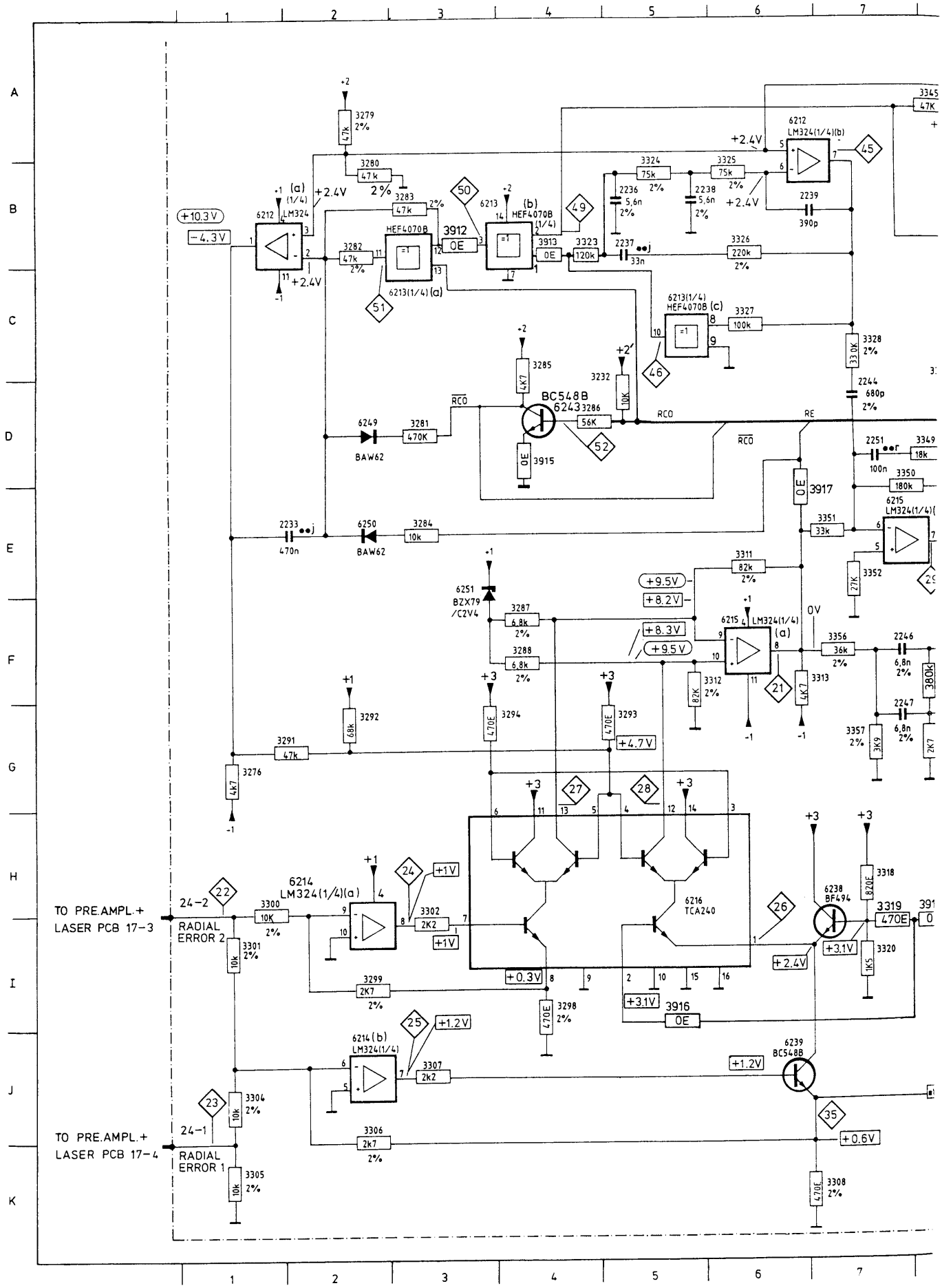
SERVO

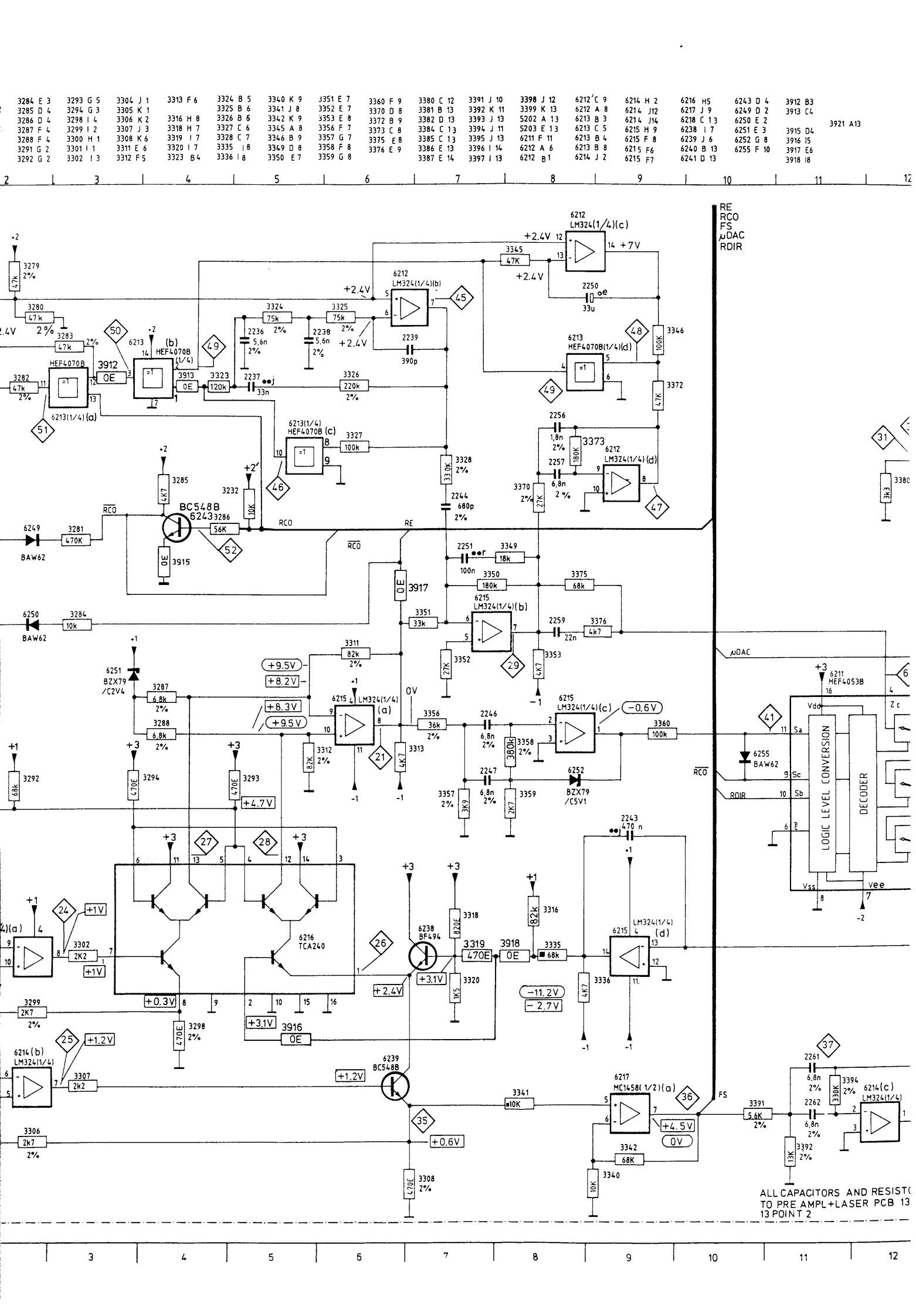
HEF4053BP		5322 209 14121
LM324N		4822 209 80587
HEF4070BP		4822 209 10265
TCA240		4822 209 80629
μA714CN		4822 209 80617
BC548B		4822 130 44196
BF494		4822 130 44195
BD135		4822 130 40823
BD136		4822 130 40824
BAW62		4822 130 30613
BZX79-C2V4		4822 130 31253
BZX79-C5V1		4822 130 34233
5202, 5203		4822 156 20966
2236, 2238	5,6 nF-63 V-2%	4822 121 50543
2239	390 pF-630 V-2%	5322 121 54128
2244	680 pF-250 V-2%	5322 121 54174
2246, 2247, 2257	6,8 nF- 63 V-2%	4822 121 50538
2261, 2262, 2256	1,8 nF-160 V-2%	5322 121 54087
2259	22 nF	4822 122 31797
3291	47k-SFR16	4822 116 52284
3384, 3385	PTC 9E4-60 V	4822 116 40031

0E	Chip jumper	4822 111 90163
1E5		4822 111 90381
2E2		4822 111 90507
3E3		4822 111 90447
4E7		5322 111 90376
100E		5322 111 90091
120E		4822 111 90403
470E		4822 111 90217
680E		4822 111 90162
820E		4822 111 90171
1k		5322 111 90171
1k5		4822 111 90151
1k8		5322 111 90101
2k2		4822 111 90248
2k7		4822 111 90179
3k3		4822 111 90188
3k9		4822 116 60156
4k7		5322 111 90111
5k1		5322 111 90268
5k6		5322 111 90114
6k2		4822 111 90545
6k8		4822 111 90544
7k5		5322 111 90276
8k2		5322 111 90118
10k		4822 111 90248
13k		4822 111 90509
15k		4822 111 90196
18k		4822 111 90238
22k		4822 111 90251
24k		4822 111 90512
27k		4822 111 90155
33k		5322 111 90267
36k		4822 111 90514
47k		4822 111 90543
56k		5322 111 90115
68k		4822 111 90202
75k		4822 111 90542
82k		4822 116 60185
91k		5322 111 90277
100k		4822 111 90214
120k		4822 111 90149
130k		4822 111 90511
150k		4822 116 60166
180k		5322 111 90273
220k		4822 111 90197
330k		4822 111 90513
360k		4822 111 90515
470k		4822 111 90161
1M		4822 111 90252
5M6		4822 111 90508

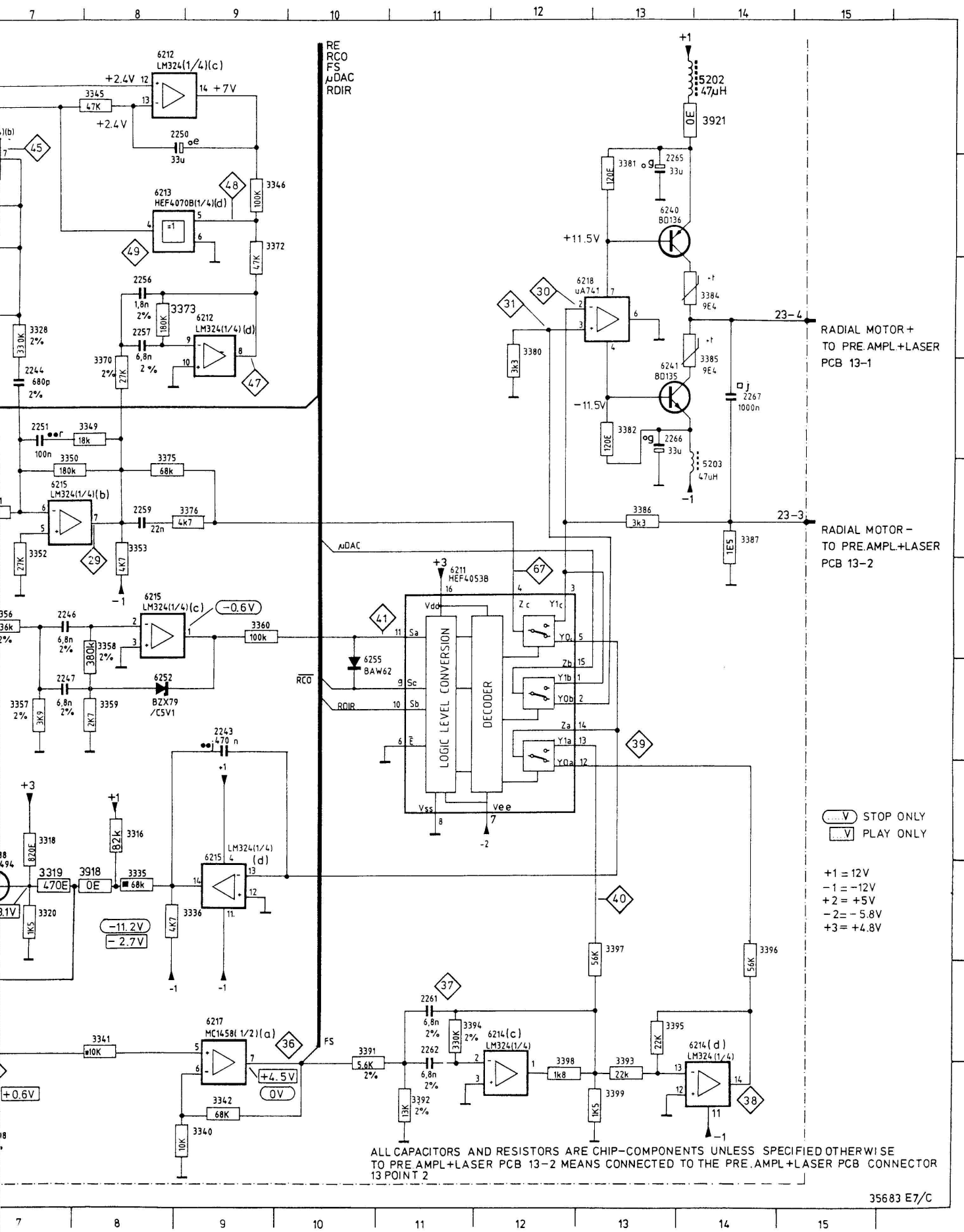
SERVO 2

2233 E 2	2246 F 7	2261 J11	3276 G 1	3284 E 3	3293 G 5	3304 J 1	3313 F 6	3324 B 5	3340 K 9	3351 E 7	3360 F 9	3380 C 12	3391 J 10	3
2236 B 5	2247 G 7	2262 J11	3279 A 2	3285 D 4	3294 G 3	3305 K 1		3325 B 6	3341 J 8	3352 E 7	3370 D 8	3381 B 13	3392 K 11	3
2237 B 5	2250 A 8			3286 D 4	3298 I 4	3306 K 2	3316 H 8	3326 B 6	3342 K 9	3353 E 8	3372 B 9	3382 D 13	3393 J 13	5
2238 B 5	2251 D 7	2265 B13	3280 B 2	3287 F 4	3299 I 2	3307 J 3	3318 H 7	3327 C 6	3345 A 8	3356 F 7	3373 C 8	3384 C 13	3394 J 11	5
2239 B 6	2256 C 8	2266 D13	3281 D 3	3288 F 4	3300 H 1	3308 K 6	3319 I 7	3328 C 7	3346 B 9	3357 G 7	3375 E 8	3385 C 13	3395 J 13	6
2243 G 9	2257 C 8	2267 D14	3282 B 2	3291 G 2	3301 I 1	3311 E 6	3320 I 7	3335 I 8	3349 D 8	3358 F 8	3376 E 9	3386 E 13	3396 I 14	6
2244 D 7	2259 E 8	3232 D5	3283 B 3	3292 G 2	3302 I 3	3312 F 5	3323 B4	3336 I 8	3350 E 7	3359 G 8		3387 E 14	3397 I 13	6



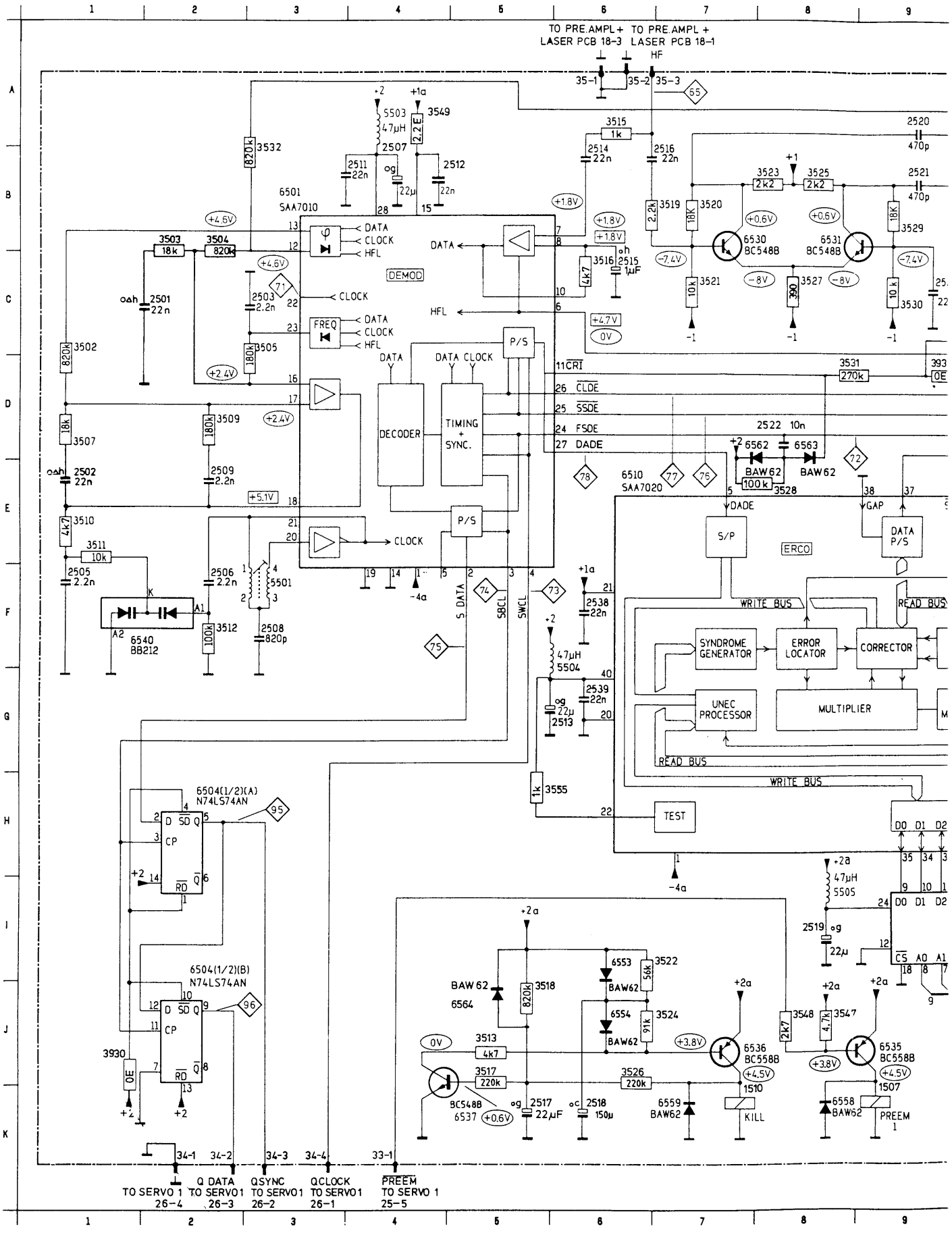

3921 A13
RE
RCO
FS
µDAC
RDIR
6212 LM324(1/4)(c)
+2.4V
+7V
3345 47K
2250 33u
6212 LM324(1/4)(b)
3279 4.7k 2%
3280 47k 2%
3283 47k 2%
3324 75k 2%
3325 75k 2%
2236 5,6n 2%
2238 5,6n 2%
2239 390p
6213 HEF4070B(1/4)(d)
3346 100K
3372 47K
6213 (b) HEF4070B (1/4)
3912 0E
3913 0E
3323 120k
2237 33n
3326 220k 2%
3282 47k 2%
6213(1/4) (a)
6213(1/4) HEF4070B (c)
3327 100k
2256 1,8n 2%
3373 180K
2257 6,8n 2%
6212 LM324(1/4) (d)
3370 27K 2%
3328 330K 2%
2244 680p 2%
3285 4K7
3232 10K
BC548B 6243
3286 56K
6249 BAW62
3281 470K
3915 0E
6250 BAW62
3284 10k
3917 0E
2251 100n
3349 18k
3350 180k
3375 68k
3351 33k
6215 LM324(1/4)(b)
2259 22n
3376 4k7
3352 27K
3353 4K7
3311 82k 2%
6251 BZX79 /C2V4
3287 6.8k 2%
3288 6.8k 2%
+9.5V
+8.2V
+8.3V
+9.5V
6215 LM324(1/4) (a)
3356 36k 2%
2246 6,8n 2%
6215 LM324(1/4)(c)
−0.6V
3360 100k
3358 380k 2%
3312 82K 2%
3313 4K7
2247 6,8n 2%
3357 2%
3K9
3359 2K7
6252 BZX79 /C5V1
6255 BAW62
6211 HEF4053B
Vdd
Sa
Sc
Sb
E
Vss
Vee
Zc
LOGIC LEVEL CONVERSION
DECODER
3292 68k
3294 470E
3293 470E
+4.7V
2243 470 n
6216 TCA240
6238 BF494
3318 820E
3319 470E
3918 0E
3335 68k
3316 82k
LM324(1/4) (d)
6215
3336 4K7
3320 1K5
+3.1V
+2.4V
−11.2V
−2.7V
3302 2K2
+1V
3299 2K7 2%
3298 470E 2%
+0.3V
+3.1V
3916 0E
6214(b) LM324(1/4)
3307 2k2
+1.2V
6239 BC548B
3341 10K
6217 MC1458(1/2)(a)
+4.5V
0V
3342 68K
3340 10K
3391 5.6K 2%
2261 6,8n 2%
2262 6,8n 2%
3394 330K 2%
3392 13K 2%
6214(c) LM324(1/4)
3306 2k7 2%
+0.6V
3308 470E 2%
3380 3k3
ALL CAPACITORS AND RESISTO
TO PRE AMPL+LASER PCB 13
13 POINT 2

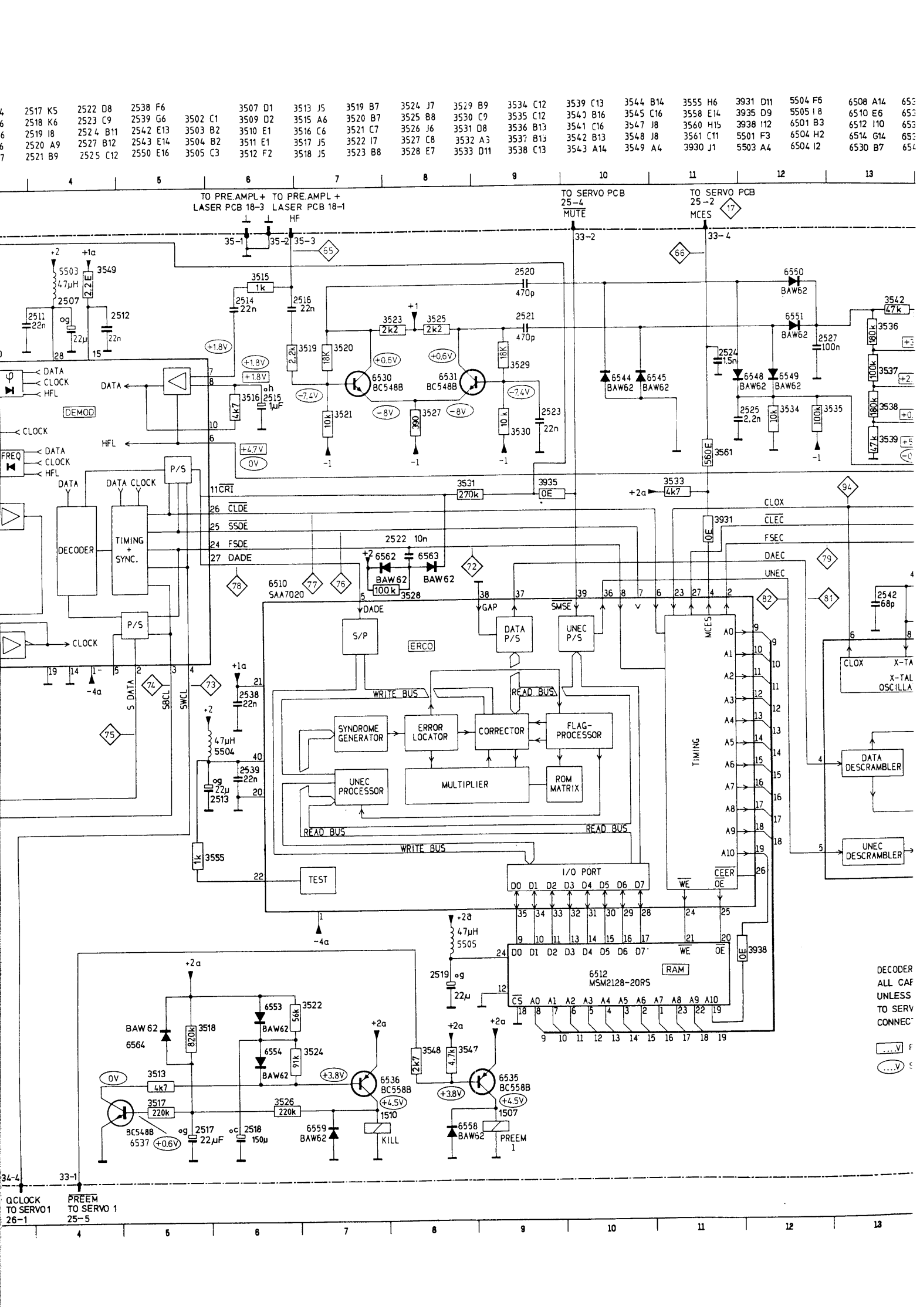
30 C 12 3391 J 10 3398 J 12 6212 C 9 6214 H 2 6216 H5 6243 D 4 3912 B3
31 B 13 3392 K 11 3399 K 13 6212 A 8 6214 J12 6217 J 9 6249 D 2 3913 C4
32 D 13 3393 J 13 5202 A 13 6213 B 3 6214 J14 6218 C 13 6250 E 2
34 C 13 3394 J 11 5203 E 13 6213 C 5 6215 H 9 6238 I 7 6251 E 3 3915 D4
35 C 13 3395 J 13 6211 F 11 6213 B 4 6215 F 8 6239 J 6 6252 G 8 3916 I5
36 E 13 3396 I 14 6212 A 6 6213 B 8 6215 F6 6240 B 13 6255 F 10 3917 E6
37 E 14 3397 I 13 6212 B1 6214 J 2 6215 F7 6241 D 13 3918 I8
3921 A13



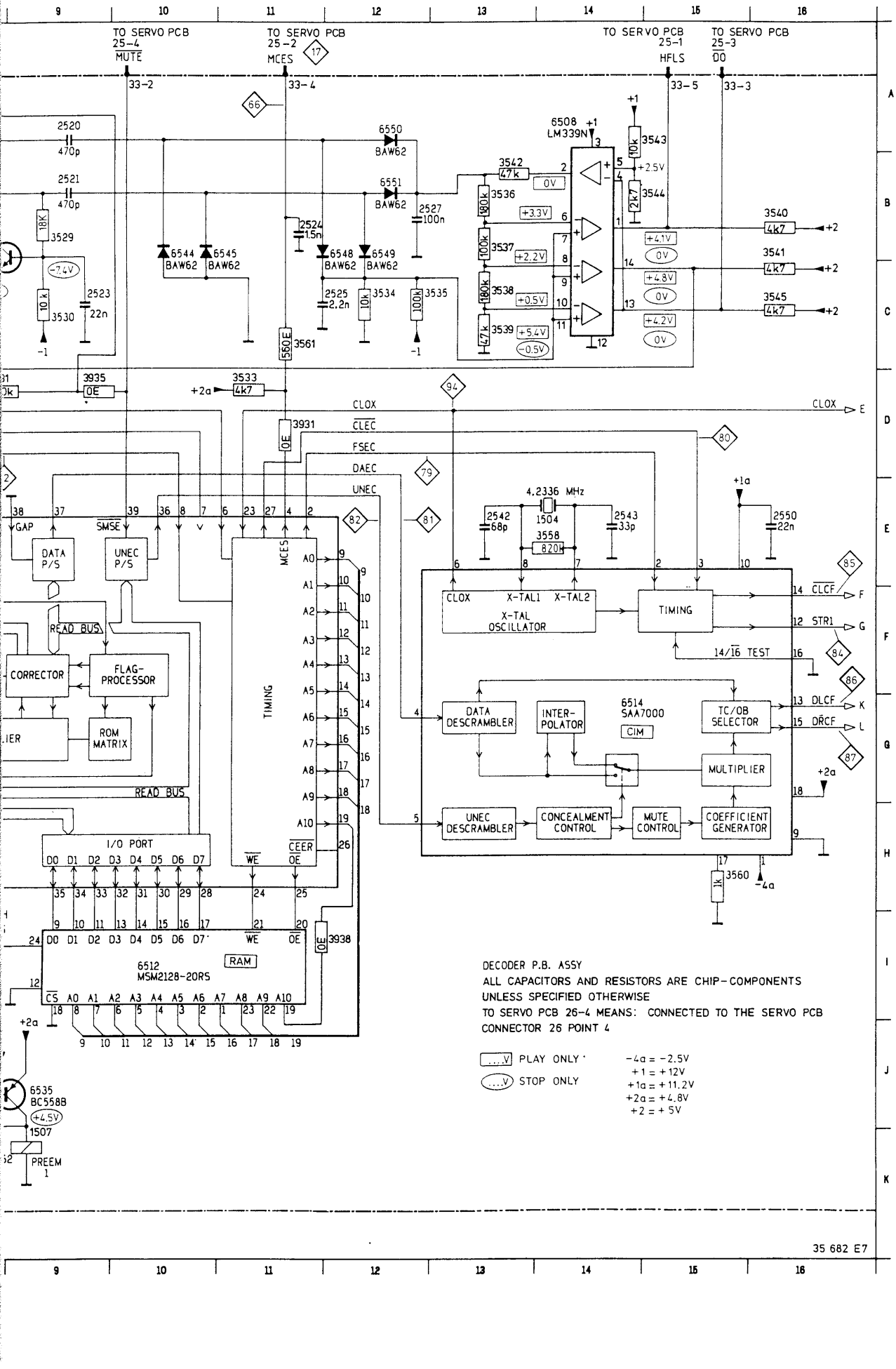
DECODING 1

1504 E14	2501 C2	2506 F2	2512 B4	2517 K5	2522 D8	2538 F6		3507 D1	3513 J5	3519 B7	3524 J7	3529 B9	3534 C12
1507 K9	2502 E1	2507 B4	2513 G6	2518 K6	2523 C9	2539 G6	3502 C1	3509 D2	3515 A6	3520 B7	3525 B8	3530 C9	3535 C12
1510 K7	2503 C3	2508 F3	2514 B6	2519 I8	2524 B11	2542 E13	3503 B2	3510 E1	3516 C6	3521 C7	3526 J6	3531 D8	3536 B13
		2509 E2	2515 C6	2520 A9	2527 B12	2543 E14	3504 B2	3511 E1	3517 J5	3522 I7	3527 C8	3532 A3	3537 B13
	2505 F1	2511 B3	2516 B7	2521 B9	2525 C12	2550 E16	3505 C3	3512 F2	3518 J5	3523 B8	3528 E7	3533 D11	3538 C13




TO PRE.AMPL+ LASER PCB 18-3
TO PRE.AMPL + LASER PCB 18-1
HF
TO SERVO PCB 25-4
MUTE
TO SERVO PCB 25-2
MCES
DEMOD
DATA
CLOCK
HFL
FREQ
P/S
DECODER
TIMING + SYNC.
6510 SAA7020
S/P
ERCO
DATA P/S
UNEC P/S
GAP
SMSE
DADE
WRITE BUS
READ BUS
SYNDROME GENERATOR
ERROR LOCATOR
CORRECTOR
FLAG-PROCESSOR
UNEC PROCESSOR
MULTIPLIER
ROM MATRIX
TEST
I/O PORT
TIMING
RAM
6512 MSM2128-20RS
DATA DESCRAMBLER
UNEC DESCRAMBLER
X-TAL OSCILLA
6530 BC548B
6531 BC548B
6535 BC558B
6536 BC558B
BC548B 6537
BAW62
6564
KILL
PREEM
QCLOCK TO SERVO1 26-1
PREEM TO SERVO 1 25-5

29 B9	3534 C12	3539 C13	3544 B14	3555 H6	3931 D11	5504 F6	6508 A14	6531 B8	6544 B10	6551 B12	6562 D7
30 C9	3535 C12	3540 B16	3545 C16	3558 E14	3935 D9	5505 I8	6510 E6	6535 J9	6545 B11	6553 I6	6563 D8
31 D8	3536 B13	3541 C16	3547 J8	3560 H15	3938 I12	6501 B3	6512 I10	6536 J7	6548 B12	6554 J6	6564 J5
32 A3	3537 B13	3542 B13	3548 J8	3561 C11	5501 F3	6504 H2	6514 G14	6537 K5	6549 B12	6558 K8	
33 D11	3538 C13	3543 A14	3549 A4	3930 J1	5503 A4	6504 I2	6530 B7	6540 F1	6550 A12	6559 K7	



DECODER P.B. ASSY
ALL CAPACITORS AND RESISTORS ARE CHIP-COMPONENTS
UNLESS SPECIFIED OTHERWISE
TO SERVO PCB 26-4 MEANS: CONNECTED TO THE SERVO PCB
CONNECTOR 26 POINT 4

....V PLAY ONLY
(....V) STOP ONLY

-4a = -2.5V
+1 = +12V
+1a = +11.2V
+2a = +4.8V
+2 = +5V

35 682 E7

1504	C2	2503	A2	2508	B3	2514	B2	2519	C4	2524	C5	2542	C2	2559	E3	2567	E6	2575	F5
1507	D5	2504	D2	2509	B2	2515	A1	2520	A3	2525	A4	2543	D2	2560	E3	2568	E6	2580	E4
1510	F5	2505	B3	2511	B1	2516	A3	2521	A4	2527	A5	2550	D2	2562	E3	2570	E6	2581	E4
2501	B3	2506	B3	2512	A3	2517	D4	2522	B2	2538	C3	2555	E4	2564	E3	2571	E6	2582	E3
2502	B3	2507	B1	2513	C2	2518	D5	2523	A4	2539	C2	2558	E4	2566	D6	2573	E5	2583	E3
2584	E3	2589	E3	2597	E2	2605	E4	2618	E5	2625	F2	2632	E2	2637	E2	3503	A3	3510	B3
2585	E3	2591	E3	2599	E2	2606	E5	2619	E5	2627	E4	2633	E2	2638	E2	3504	A2	3511	B3
2586	E3	2593	E2	2601	D5	2608	E4	2620	D2	2628	F3	2634	E2	2639	E2	3505	A2	3512	B3
2587	E3	2594	E2	2602	E4	2610	F5	2623	D4	2630	E2	2635	E2	2641	E2	3507	A2	3513	D5
2588	E3	2595	E2	2603	E5	2617	E5	2624	E4	2631	E2	2636	E2	3502	A2	3509	B2	3515	A2
3516	A2	3521	B3	3526	D6	3531	B2	3536	B5	3541	A5	3547	D6	3558	C2	3566	D4	3572	E6
3517	D4	3522	D5	3527	B4	3532	B2	3537	B5	3542	B5	3548	D6	3560	D1	3567	D3	3573	D5
3518	D4	3523	B3	3528	B1	3533	C4	3538	B5	3543	A5	3549	A3	3561	C5	3569	E4	3574	E6
3519	A3	3524	D5	3529	A4	3534	A4	3539	B5	3544	A5	3550	D3	3564	D4	3570	E4	3576	E5
3520	A3	3525	B4	3530	B4	3535	B4	3540	A5	3545	A5	3555	C2	3565	D3	3571	E3	3577	E6
3579	F5	3584	E3	3593	E4	3598	E5	3605	E2	3931	C3	3941	E4	5505	C4	6512	C4	6523	E5
3580	F5	3585	E3	3594	D5	3599	E5	3606	E2	3935	C2	3944	D4	6501	B2	6514	D2	6525	E5
3581	F4	3590	D2	3595	E4	3600	F5	3607	D4	3936	D2	5501	B3	6504	B6	6517	D3	6530	A3
3582	E5	3591	E2	3596	E4	3601	F5	3608	D4	3937	E6	5503	B1	6508	A5	6519	D3	6531	A4
3583	E5	3592	E2	3597	E4	3602	F4	3930	A6	3938	C4	5504	C1	6510	C2	6520	D2	6535	D6
6536	D6	6548	A4	6554	C5	6563	B1												
6537	D5	6549	A4	6558	D5	6564	D5												
6540	B4	6550	A4	6559	F6														
6544	A4	6551	A4	6561	D4														
6545	A4	6553	C5	6562	B1														

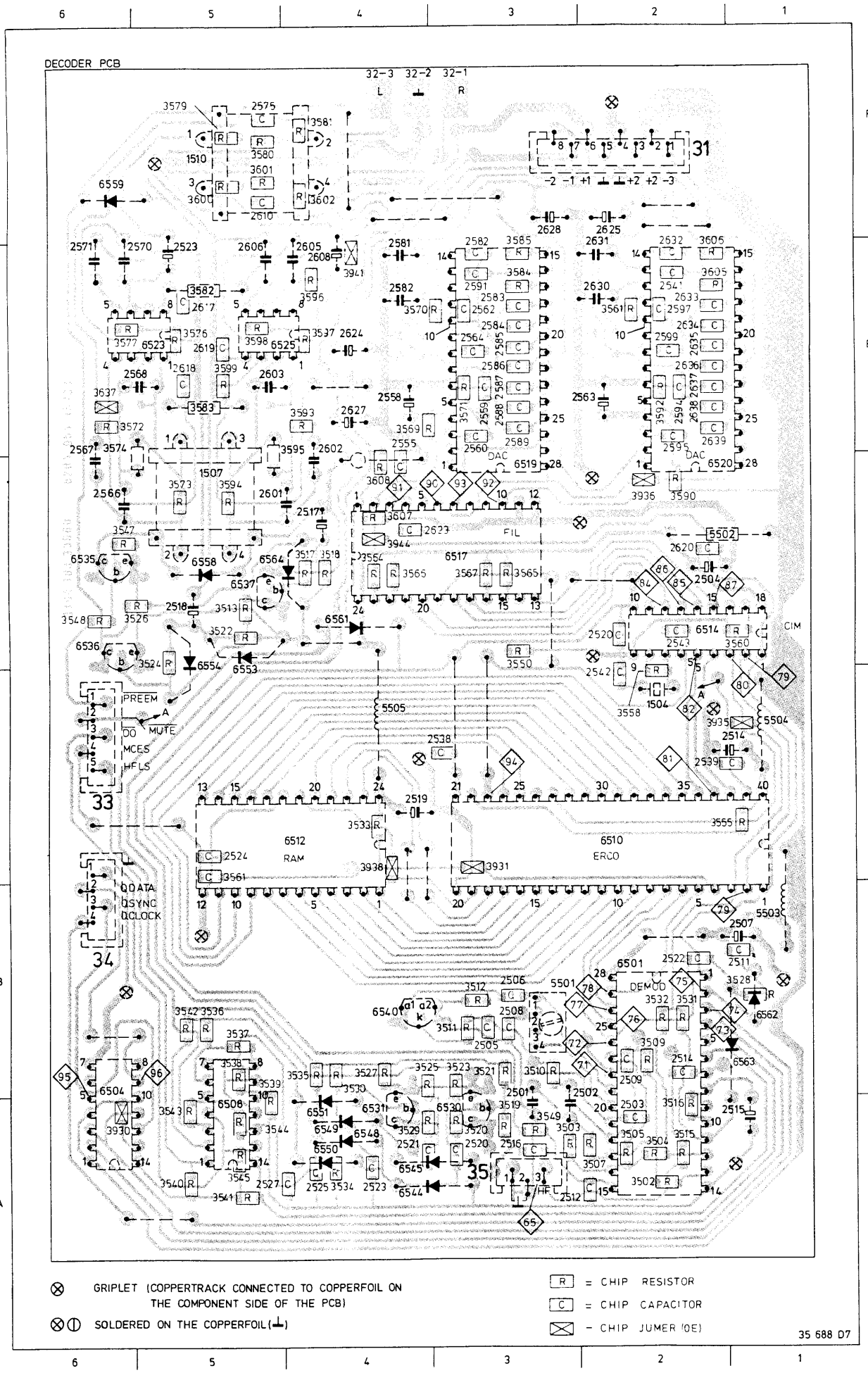
DECODER

SAA7010	DEMOD	4822 209 10857
N74LS74AN		4822 209 80782
LM339N		4822 209 80631
SAA7020	ERCO	4822 209 10377
MSM2128-20R		4822 209 10379
SAA7000	CIM	4822 209 10375
BC548B		4822 130 40937
BC558B		4822 130 44197
BAW62		4822 130 30613
BB212		4822 130 31129
1504	X-tal 4.2336 MHz	4822 242 70643
1507,1510	Reed relais	4822 280 20115
5501		4822 156 21155
5502,5504, 5505	47 μH	4822 156 20966

0E	chip jumper	4822 111 90163
2E2		4822 111 90507
47E		4822 111 90217
82E		4822 116 60158
100E		5322 111 90091
150E		5322 111 90098
390E		5322 111 90138
560E		5322 111 90113
620E		4822 111 90516
1k		5322 111 90092
1k8		5322 111 90101
2k2		5322 111 90102
2k7		4822 111 90179
4k7		5322 111 90111
10k		4822 111 90249
18k		4822 111 90238
47k		5322 111 90112
56k		5322 111 90115
91k		5322 111 90277
100k		4822 111 90148
180k		5322 111 90273
220k		4822 111 90197
270k		4822 111 90302
820k		4822 111 90205

33p	4822 122 31756
68p	4822 122 31961
100p	4822 122 31765
470p	4822 122 31727
820p	4822 122 31974
1n5	4822 122 31781
2n2	4822 122 31644
10n	4822 122 31728
22n	4822 122 31797
100n	4822 122 31947

DECODER P.C.B.



⊗ GRIPLET (COPPERTRACK CONNECTED TO COPPERFOIL ON THE COMPONENT SIDE OF THE PCB)

⊗⓪ SOLDERED ON THE COPPERFOIL(⊥)

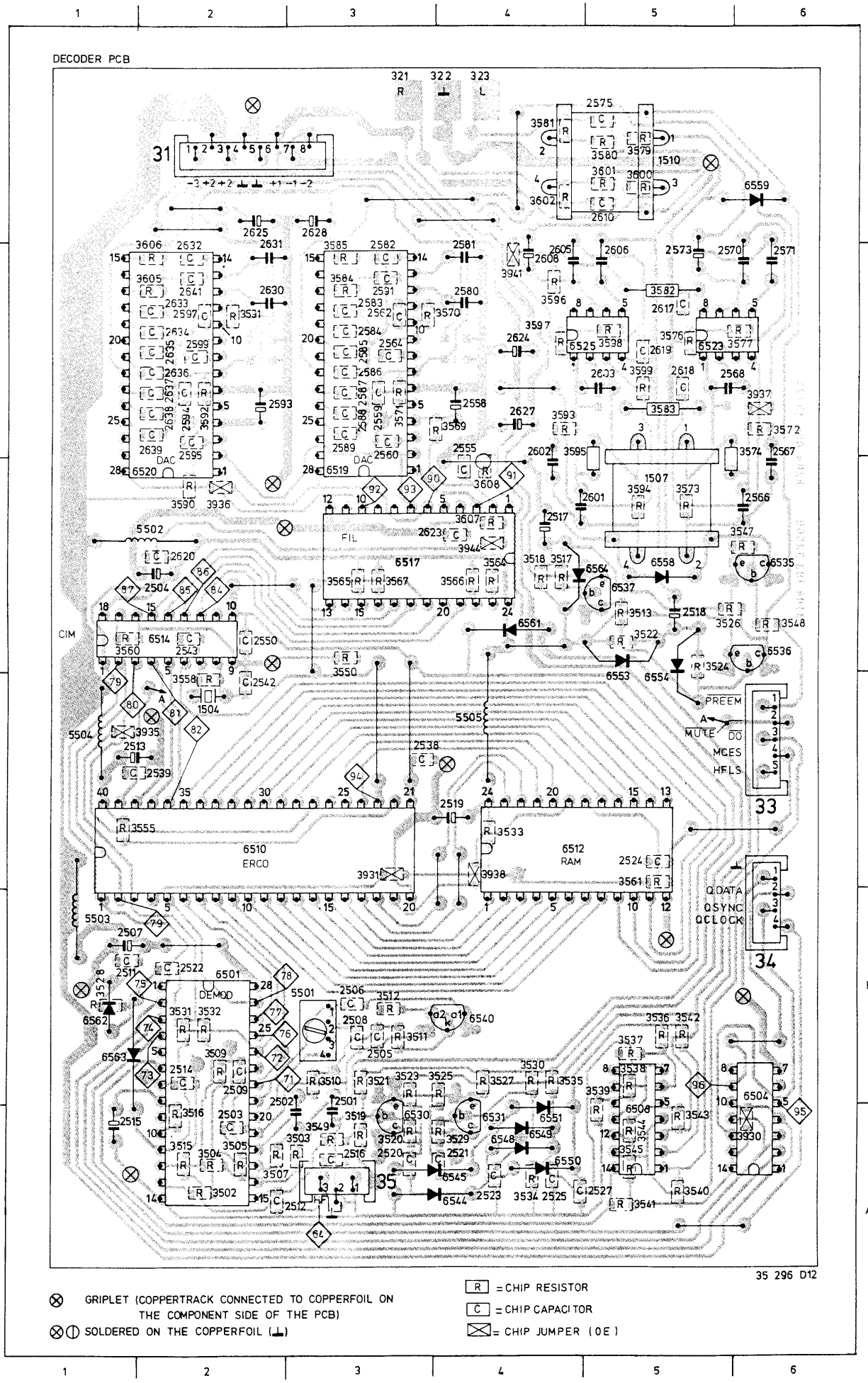
R = CHIP RESISTOR

C = CHIP CAPACITOR

⊠ = CHIP JUMER ('0E')

35 688 D7

DECODER P.C.B.



35 296 D12

⊗ GRIPLET (COPPERTRACK CONNECTED TO COPPERFOIL ON THE COMPONENT SIDE OF THE PCB)

⊗ⓘ SOLDERED ON THE COPPERFOIL (⊥)

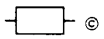
R = CHIP RESISTOR

C = CHIP CAPACITOR

⊠ = CHIP JUMPER (0E)

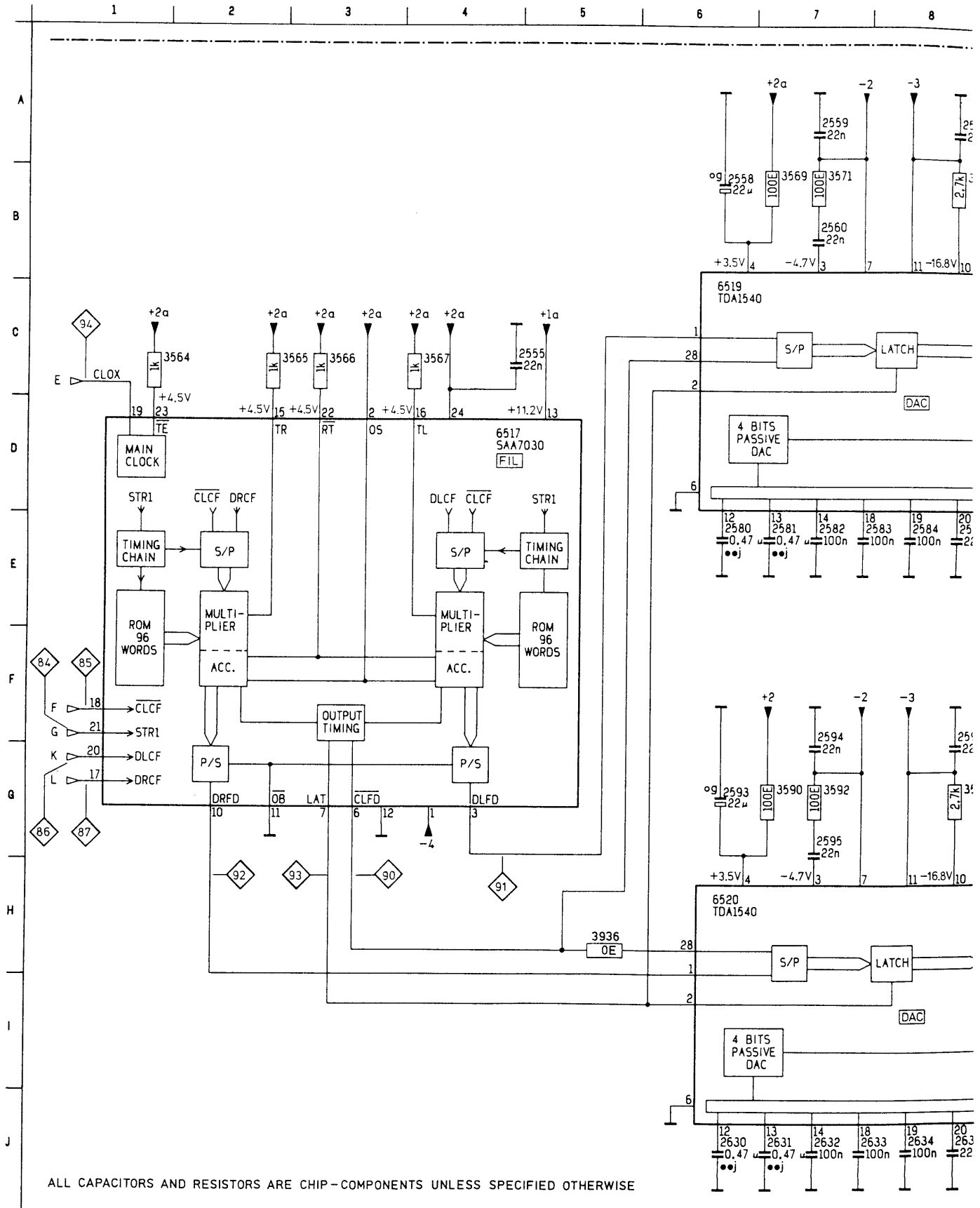
1504	C2	2503	A2	2508	B3	2514	B2	2519	C4	2524	C5	2542	C2	2559	E3	2567	E6	2575	F5
1507	D5	2504	D2	2509	B2	2515	A1	2520	A3	2525	A4	2543	D2	2560	E3	2568	E6	2580	E4
1510	F5	2505	B3	2511	B1	2516	A3	2521	A4	2527	A5	2550	D2	2562	E3	2570	E6	2581	E4
2501	B3	2506	B3	2512	A3	2517	D4	2522	B2	2538	C3	2555	E4	2564	E3	2571	E6	2582	E3
2502	B3	2507	B1	2513	C2	2518	D5	2523	A4	2539	C2	2558	E4	2566	D6	2573	E5	2583	E3
2584	E3	2589	E3	2597	E2	2605	E4	2618	E5	2625	F2	2632	E2	2637	E2	3503	A3	3510	B3
2585	E3	2591	E3	2599	E2	2606	E5	2619	E5	2627	E4	2633	E2	2638	E2	3504	A2	3511	B3
2586	E3	2593	E2	2601	D5	2608	E4	2620	D2	2628	F3	2634	E2	2639	E2	3505	A2	3512	B3
2587	E3	2594	E2	2602	E4	2610	F5	2623	D4	2630	E2	2635	E2	2641	E2	3507	A2	3513	D5
2588	E3	2595	E2	2603	E5	2617	E5	2624	E4	2631	E2	2636	E2	3502	A2	3509	B2	3515	A2
3516	A2	3521	B3	3526	D6	3531	B2	3536	B5	3541	A5	3547	D6	3558	C2	3566	D4	3572	E6
3517	D4	3522	D5	3527	B4	3532	B2	3537	B5	3542	B5	3548	D6	3560	D1	3567	D3	3573	D5
3518	D4	3523	B3	3528	B1	3533	C4	3538	B5	3543	A5	3549	A3	3561	C5	3569	E4	3574	E6
3519	A3	3524	D5	3529	A4	3534	A4	3539	B5	3544	A5	3550	D3	3564	D4	3570	E4	3576	E5
3520	A3	3525	B4	3530	B4	3535	B4	3540	A5	3545	A5	3555	C2	3565	D3	3571	E3	3577	E6
3579	F5	3584	E3	3593	E4	3598	E5	3605	E2	3931	C3	3941	E4	5505	C4	6512	C4	6523	E5
3580	F5	3585	E3	3594	D5	3599	E5	3606	E2	3935	C2	3944	D4	6501	B2	6514	D2	6525	E5
3581	F4	3590	D2	3595	E4	3600	F5	3607	D4	3936	D2	5501	B3	6504	B6	6517	D3	6530	A3
3582	E5	3591	E2	3596	E4	3601	F5	3608	D4	3937	E6	5503	B1	6508	A5	6519	D3	6531	A4
3583	E5	3592	E2	3597	E4	3602	F4	3930	A6	3938	C4	5504	C1	6510	C2	6520	D2	6535	D6
6536	D6	6548	A4	6554	C5	6563	B1												
6537	D5	6549	A4	6558	D5	6564	D5												
6540	B4	6550	A4	6559	F6														
6544	A4	6551	A4	6561	D4														
6545	A4	6553	C5	6562	B1														

DECODER

SAA7030	FIL	4822 209 10378
TDA1540D	DAC	4822 209 81453
NE5532N		5322 209 86234
BAX18A		4822 130 34121
		
0E		4822 111 90163
2E2		4822 111 90507
47E		4822 111 90217
82E		4822 116 60158
100E		5322 111 90091
150E		5322 111 90098
390E		5322 111 90138
560E		5322 111 90113
620E		4822 111 90516
1k		5322 111 90092
1k8		5322 111 90101
2k2		5322 111 90102
2k7		4822 111 90179
4k7		5322 111 90111
10k		4822 111 90249
18k		4822 111 90238
47k		5322 111 90112
56k		5322 111 90115
91k		5322 111 90277
100k		4822 111 90148
180k		5322 111 90273
220k		4822 111 90197
270k		4822 111 90302
820k		4822 111 90205
33p		4822 122 31756
68p		4822 122 31961
100p		4822 122 31765
470p		4822 122 31727
820p		4822 122 31974
1n5		4822 122 31781
2n2		4822 122 31644
10n		4822 122 31728
22n		4822 122 31797
100n		4822 122 31947

DECODING 2

2504 E15	2555 C4	2560 B7	2568 A11	2580 E6	2585 E8	2591 E11	2599 G10	2606 I12	2620 E15	2630 J6	2635 J8	2641 J1
		2562 A8	2570 B12	2581 E7	2586 E9	2593 G6	2601 G11	2608 I14	2623 G14	2631 J7	2636 J9	3550 E1
		2564 B10	2571 C12	2582 E7	2587 E9	2594 G7	2602 G11	2610 I16	2624 G16	2632 J7	2637 J9	3564 C
	2558 B6	2566 A11	2573 C14	2583 E7	2588 E9	2595 G7	2603 G11	2617 B13	2625 H16	2633 J7	2638 J9	3565 C2
	2559 A7	2567 A11	2575 C16	2584 E8	2589 E10	2597 G8	2605 H12	2618 C13	2627 E16	2634 J8	2639 J10	3566 C3
								2619 I13	2628 G16			



ALL CAPACITORS AND RESISTORS ARE CHIP-COMPONENTS UNLESS SPECIFIED OTHERWISE

2580 E6
2581 E7
2582 E7
2583 E7
2584 E8

2585 E8
2586 E9
2587 E9
2588 E9
2589 E10

2591 E11
2593 G6
2594 G7
2595 G7
2597 G8

2599 G10
2601 G11
2602 G11
2603 G11
2605 H12

2606 I12
2608 I14
2610 I16
2617 B13
2618 C13
2619 I13

2620 E15
2623 G14
2624 G16
2625 H16
2627 E16
2628 G16

2630 J6
2631 J7
2632 J7
2633 J7
2634 J8

2635 J8
2636 J9
2637 J9
2638 J9
2639 J10

2641 J11
3550 E15
3564 C1
3565 C2
3566 C3

3567 C4
3569 B7
3570 B8
3571 B7
3572 A11

3573 A12
3574 B11
3576 B12
3577 C12
3579 C14

3580 C15
3581 C15
3582 B13
3583 D13
3584 D11
3585 D11
3590 G7

3591 G8
3592 G7
3593 G11
3594 G12
3595 G11
3596 H13

3597 H12
3598 H12.
3599 I13
3600 I14
3601 I15
3602 I15

3605 I11
3606 I11
3607 G15
3608 F15
6517 D4

4 5 6 7 8 9 10 11 12

+2a +2a +2a +1a
1k 3567
2555 22n
2 +4.5V 16 24 +11.2V 13
OS TL
6517
SAA7030
FIL
DLCF CLCF STR1
S/P
TIMING CHAIN
MULTI-PLIER
ACC.
ROM 96 WORDS
P/S
LFD DLFD
12 1 3
-4
90
91

+2a -2 -3
2559 22n
2562 22n
og 2558 22µ
100E 3569
100E 3571
2560 22n
2.7k 3570
+3.5V 4 -4.7V 3 7 11 -16.8V 10 22
6519
TDA1540
3937 0E
2566 5.1n
3572 1k
2567 15n
820k 3573
2568 2.2n
3574 1.8k
2564 820p
9 8
SYMMETRY OSCILLATOR
6523(1/2)(A) NE5532N
0V 2 3 1 +3.4V
3576 2.2k
2570 2.2n
2.2k 3577
2571 1.2n
1 28 2
S/P LATCH
10 BITS ACTIVE DAC
DAC
4 BITS PASSIVE DAC
16 -9.8V
17 -9.7V 3584 82E
15 -9.1V 3585 620E
2591 1.5n
6
12 2580 0.47µ ●●j
13 2581 0.47µ ●●j
14 2582 100n
18 2583 100n
19 2584 100n
20 2585 22n
21 2586 22n
23 2587 22n
24 2588 22n
25 2589 22n

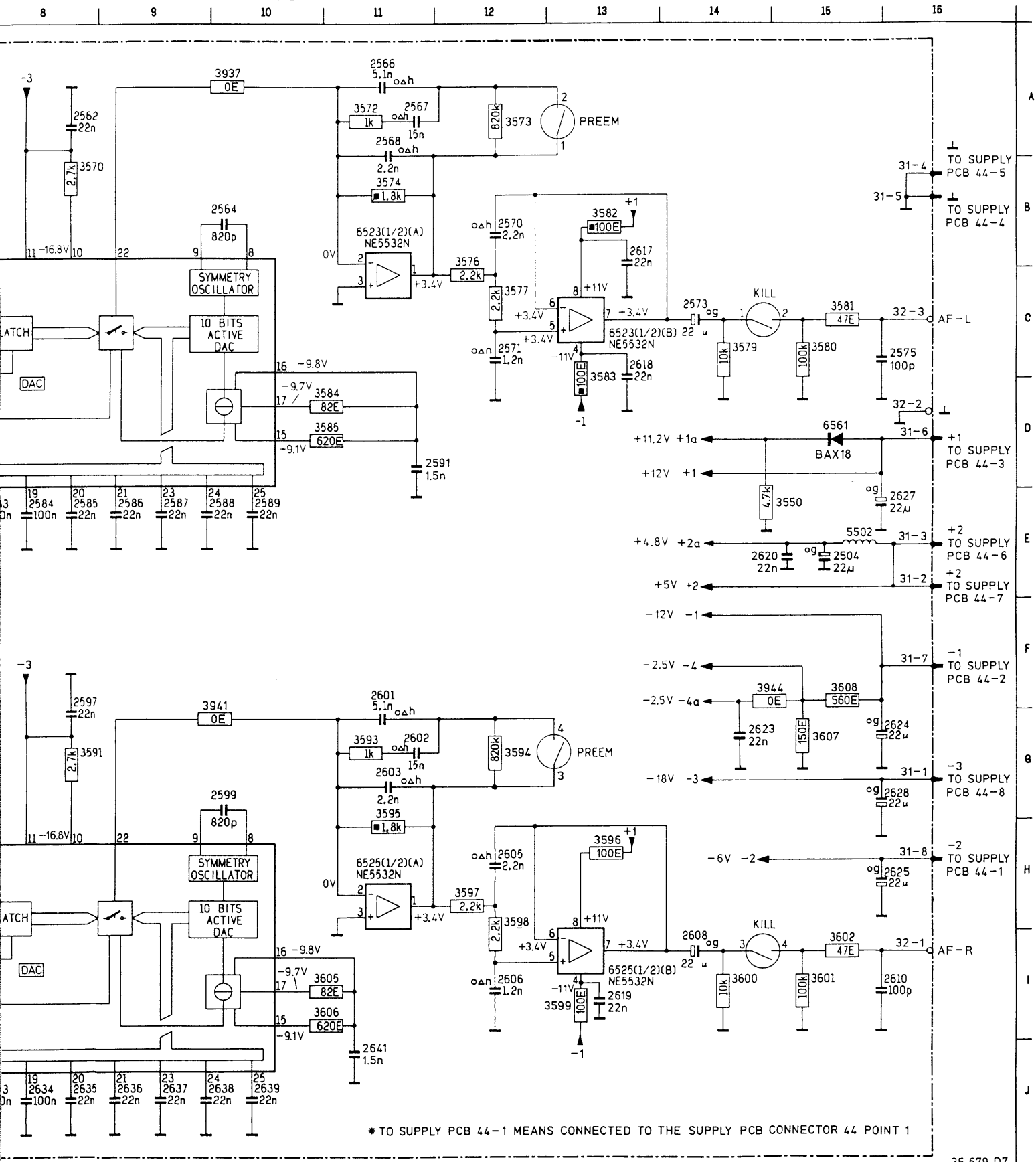
+2 -2 -3
2594 22n
2597 22n
og 2593 22µ
100E 3590
100E 3592
2595 22n
2.7k 3591
+3.5V 4 -4.7V 3 7 11 -16.8V 10 22
6520
TDA1540
3941 0E
2601 5.1n
3593 1k
2602 15n
820k 3594
2603 2.2n
3595 1.8k
2599 820p
9 8
SYMMETRY OSCILLATOR
6525(1/2)(A) NE5532N
0V 2 3 1 +3.4V
3597 2.2k
2605 2.2n
2.2k 3598
2606 1.2n
3936 0E
28 1 2
S/P LATCH
10 BITS ACTIVE DAC
DAC
4 BITS PASSIVE DAC
16 -9.8V
17 -9.7V 3605 82E
15 -9.1V 3606 620E
2641 1.5n
6
12 2630 0.47µ ●●j
13 2631 0.47µ ●●j
14 2632 100n
18 2633 100n
19 2634 100n
20 2635 22n
21 2636 22n
23 2637 22n
24 2638 22n
25 2639 22n

MPONENTS UNLESS SPECIFIED OTHERWISE

* TO SUPPLY PCB 44-1 MEA

4 5 6 7 8 9 10 11 12

J8	2641 J11	3567 C4	3573 A12	3580 C15	3591 G8	3597 H12	3605 I11	6519 C6	6525 I13	3936 H5
J9	3550 E15	3569 B7	3574 B11	3581 C15	3592 G7	3598 H12	3606 I11	6520 H6	6561 D15	3937 A10
J9	3564 C1	3570 B8	3576 B12	3582 B13	3593 G11	3599 I13	3607 G15	6523 B11	5502 E15	3941 F10
J9	3565 C2	3571 B7	3577 C12	3583 D13	3594 G12	3600 I14	3608 F15	6523 C13		3944 F14
J10	3566 C3	3572 A11	3579 C14	3584 D11	3595 G11	3601 I15	6517 D4	6525 H11		
				3585 D11	3596 H13	3602 I15				
				3590 G7						

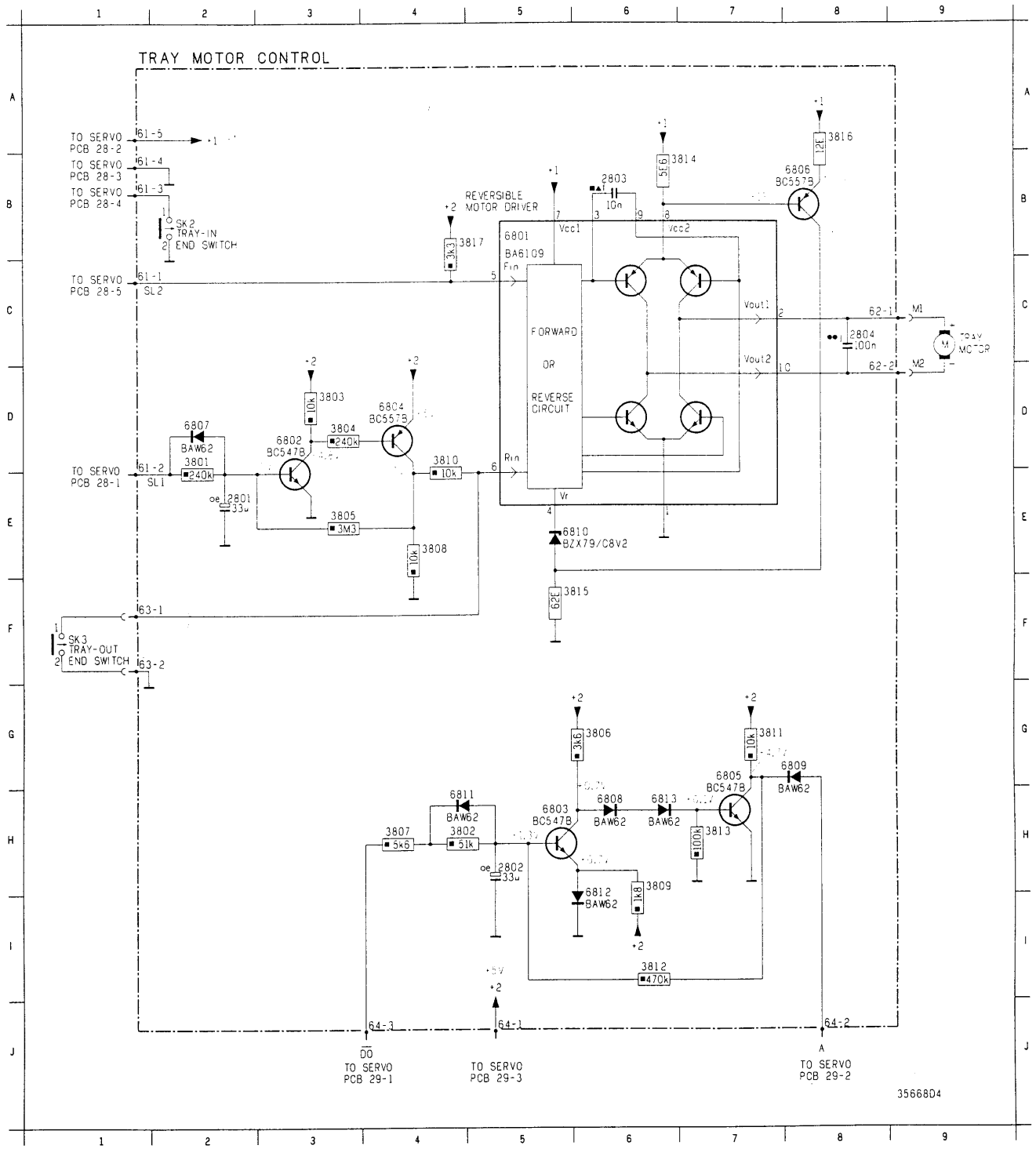


* TO SUPPLY PCB 44-1 MEANS CONNECTED TO THE SUPPLY PCB CONNECTOR 44 POINT 1

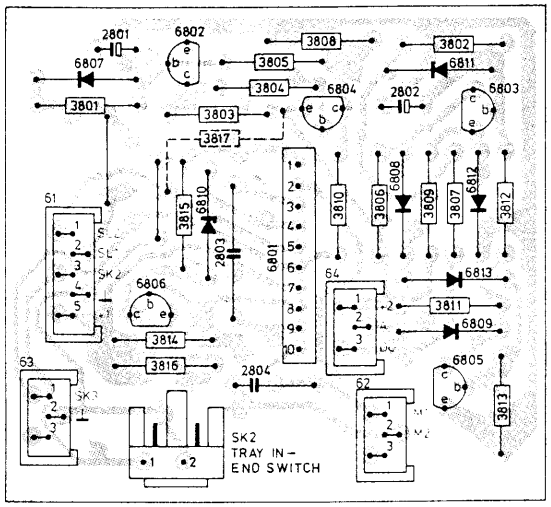
35 679 D7

TRAY CONTROL CIRCUIT

2801 E 2 2804 C 8 3803 D 3 3806 G 6 3809 H 6 3812 I 6 3815 F 6 6801 B 5 6804 D 4 6807 D 2 6810 E 6 6813 H 6
2802 H 5 3801 D 2 3804 D 3 3807 H 4 3810 D 4 3813 H 7 3816 A 8 6802 D 3 6805 G 7 6808 H 5 6811 H 4
2803 B 6 3802 H 4 3805 E 3 3808 E 4 3811 G 7 3814 B 7 3817 B 5 6803 H 5 6805 B 8 6809 G 8 6812 H 6

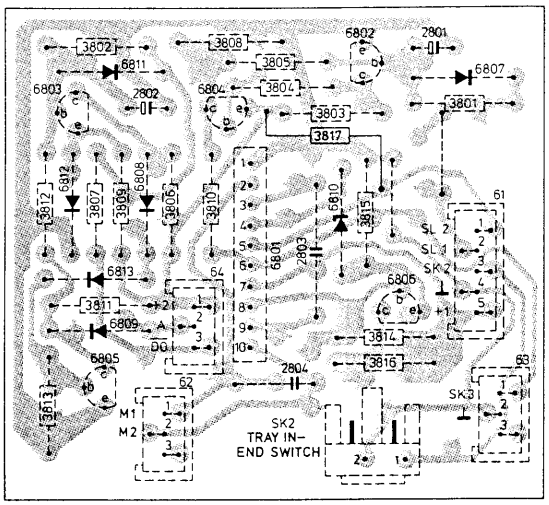


TRAY CONTROL P.C.B.



35725 B 13

2801	A3	
2802	C3	
2803	B2	
2804	B1	
3801	A3	
3802	C3	
3803	B3	
3804	B3	
3805	B3	
3806	B2	
3807	C2	
3808	B3	
3809	C2	
3810	B2	
3811	C2	
3812	C2	
3813	C1	
3814	B2	
3815	B2	
3816	B2	
3817	B3	
6801	B2	
6802	B3	
6803	C3	
6804	B3	
6805	C2	
6806	B2	
6807	A3	
6808	C2	
6809	C2	
6810	B2	
6811	C3	
6812	C2	
6813	C2	



35726 B 13

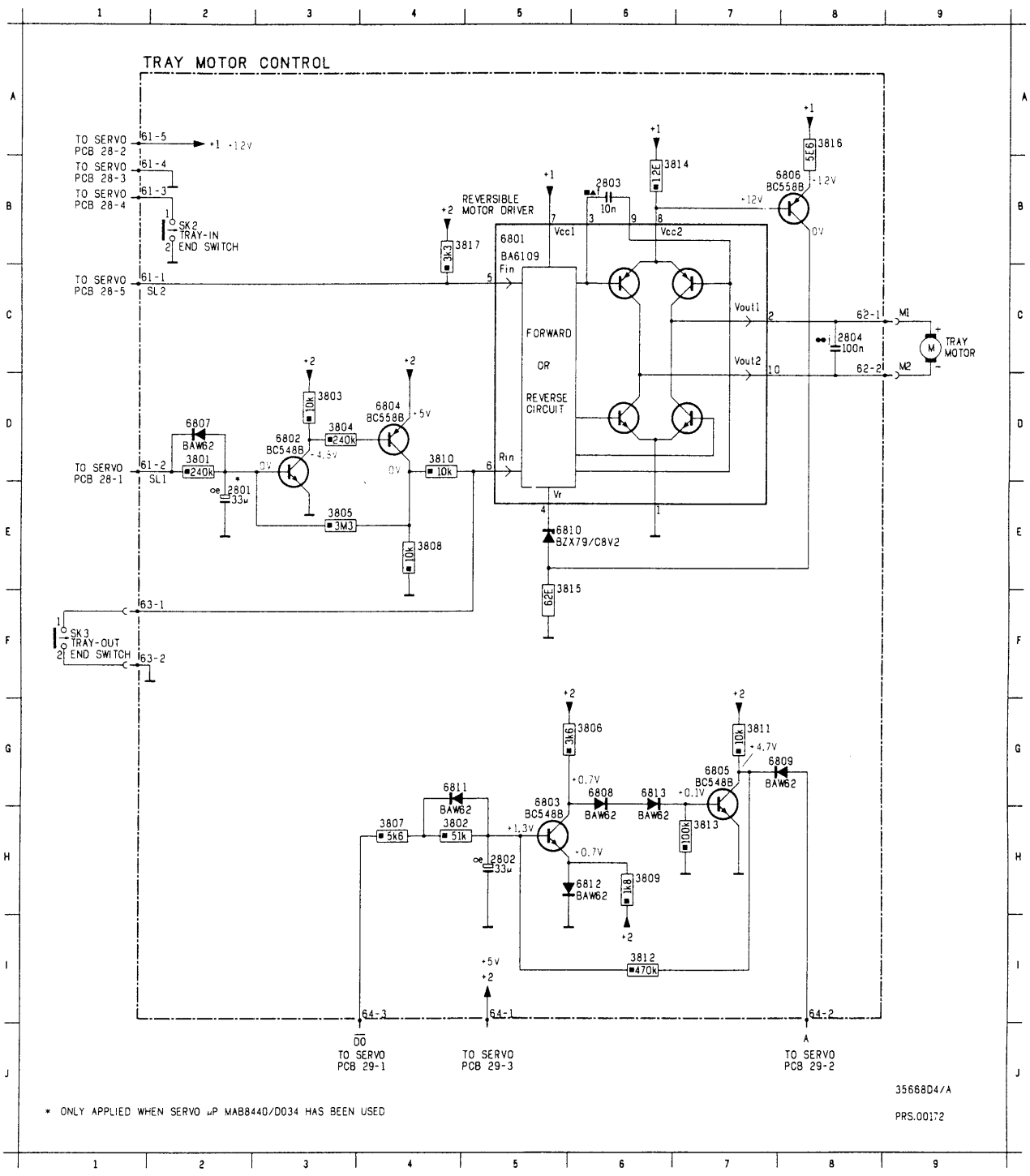
2801	C3	
2802	A3	
2803	B2	
2804	B1	
3801	C3	
3802	A3	
3803	B3	
3804	B3	
3805	B3	
3806	B2	
3807	A2	
3808	B3	
3809	A2	
3810	B2	
3811	A2	
3812	A2	
3813	A1	
3814	B2	
3815	B2	
3816	B2	
3817	B3	
6801	B2	
6802	B3	
6803	A3	
6804	B3	
6805	A2	
6806	C2	
6807	C3	
6808	A2	
6809	A2	
6810	B2	
6811	A3	
6812	A2	
6813	A2	

Tray control

IC		
6801	BA6109	4822 209 82059
Transistors		
BC547B BC557B		4822 130 40959 4822 130 44568
Diodes		
BAW62 BZX79-C8V2		4822 130 30613 4822 130 34382
Resistors		
3814 3815 3816	5E6 - NFR25 62E - NFR25 12E - NFR25	4822 111 30502 4822 111 30529 4822 111 30511
Switches		
SK2	Tact switch	4822 276 10863

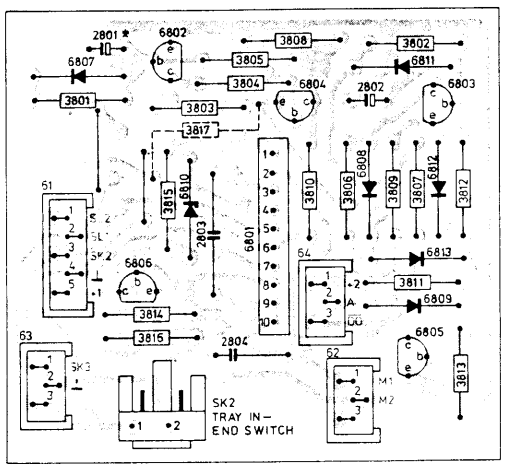
TRAY CONTROL CIRCUIT

2801 E 2 2804 C 8 3803 D 3 3806 G 6 3809 H 6 3812 I 6 3815 E 6 6801 B 5 6804 D 4 6807 D 2 6810 E 6 6813 G 6 \\\ G 6
2802 H 5 3801 D 2 3804 D 3 3807 H 4 3810 D 4 3813 H 7 3816 A 8 6802 D 3 6805 G 7 6808 G 6 6811 G 4 SK2 B 2
2803 B 6 3802 H 4 3805 E 3 3808 E 4 3811 G 7 3814 B 7 3817 B 5 6803 G 5 6806 B 8 6809 G 8 6812 H 6 SK3 F 1



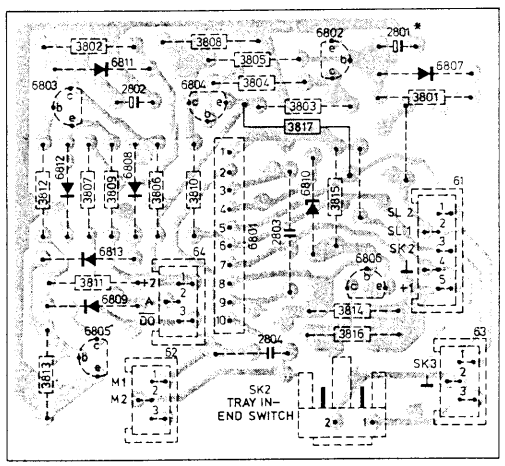
* ONLY APPLIED WHEN SERVO µP MAB8440/D034 HAS BEEN USED

TRAY CONTROL P.C.B.



* CAPACITOR ONLY APPLIED IF SERVO μP MAB 8440 HAS BEEN USED

35725 B 13/B



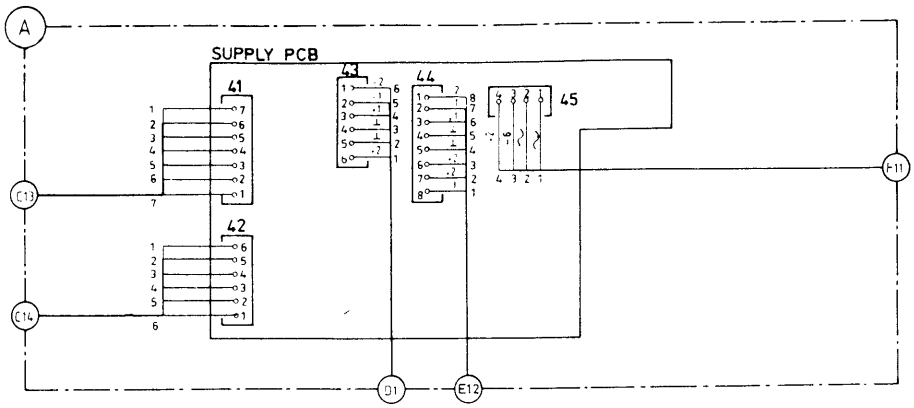
* CAPACITOR 2801 ONLY APPLIED IF SERVO μP MAB 8440/D034 HAS BEEN USED.

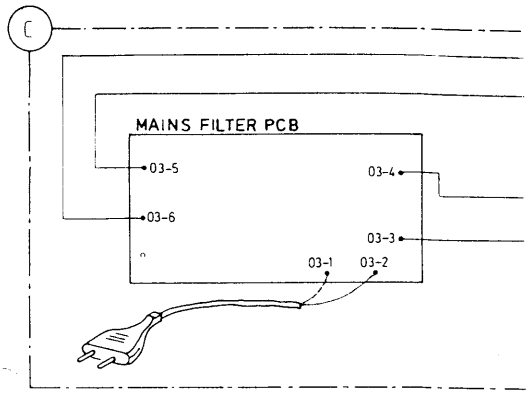
35726 B 13/B

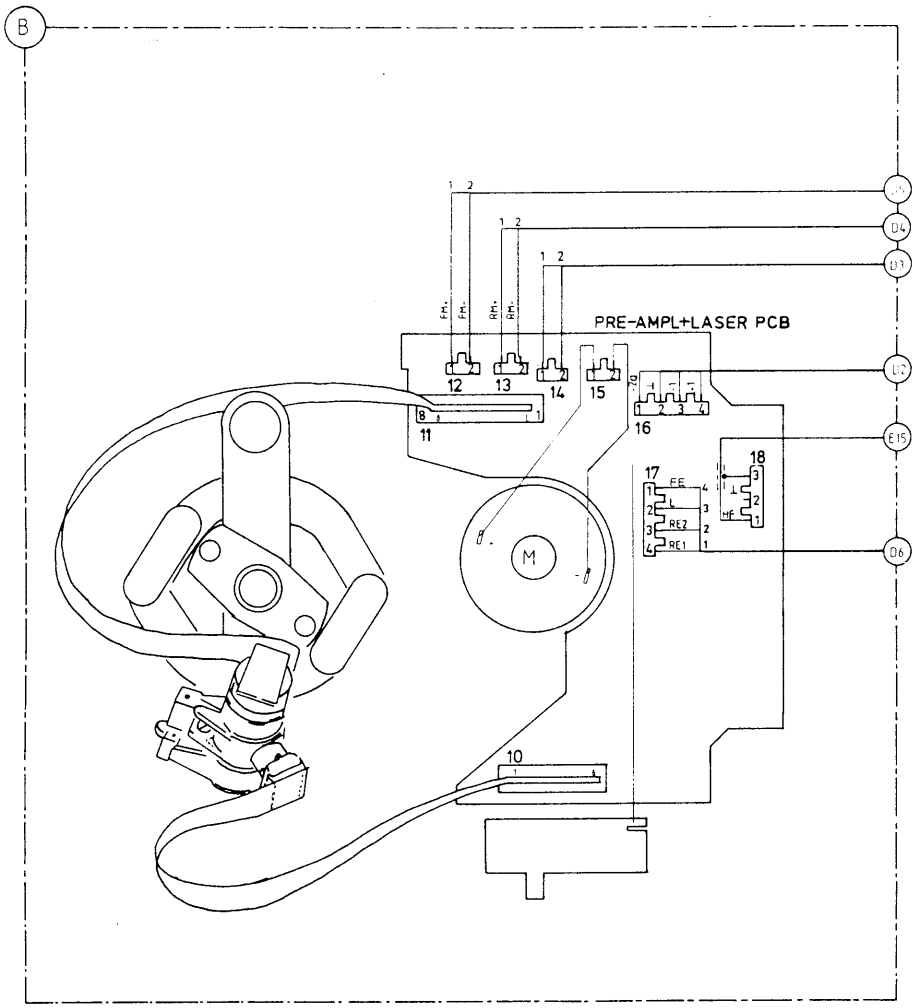
2801	A3
2802	C3
2803	B2
2804	B1
3801	A3
3802	C3
3803	B3
3804	B3
3805	B3
3806	B2
3807	C2
3808	B3
3809	C2
3810	B2
3811	C2
3812	C2
3813	C1
3814	B2
3815	B2
3816	B2
3817	B3
6801	B2
6802	B3
6803	C3
6804	B3
6805	C2
6806	B2
6807	A3
6808	C2
6809	C2
6810	B2
6811	C3
6812	C2
6813	C2

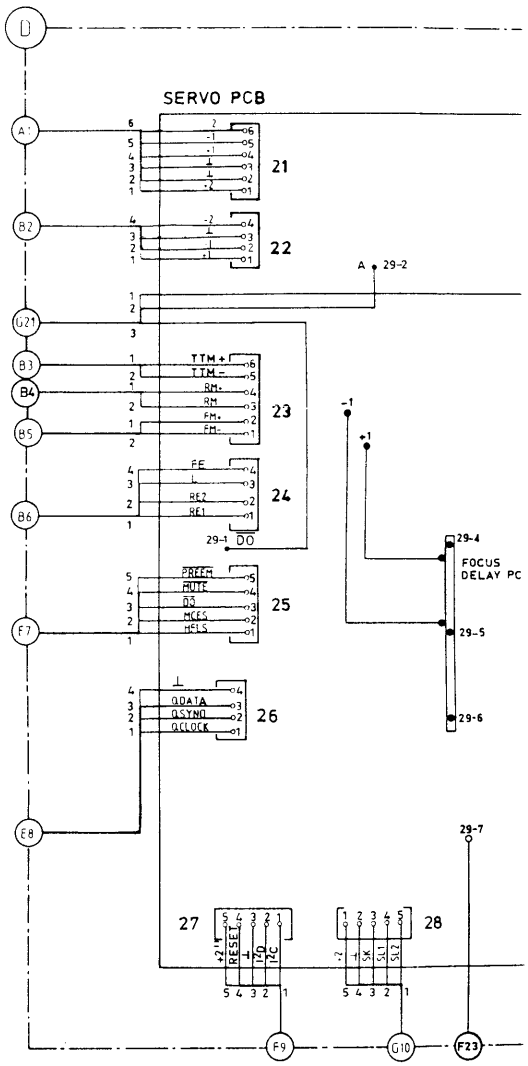
Tray control

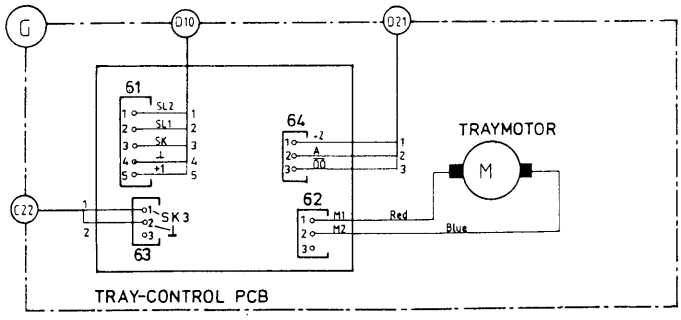
6801	BA6109	4822 209 82059
BC548B BC558B		4822 130 44196 4822 130 44197
BAW62 BZX79-C8V2		4822 130 30613 4822 130 34382
3814 3815 3816	12E - NFR25 62E - NFR25 5E6 - NFR25	4822 111 30511 4822 111 30529 4822 111 30502
SK2	Tact switch	4822 276 10863

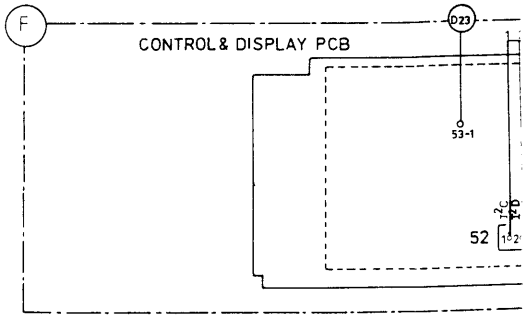

A
SUPPLY PCB
41
42
43
44
45
C13
C14
D1
E12
F11

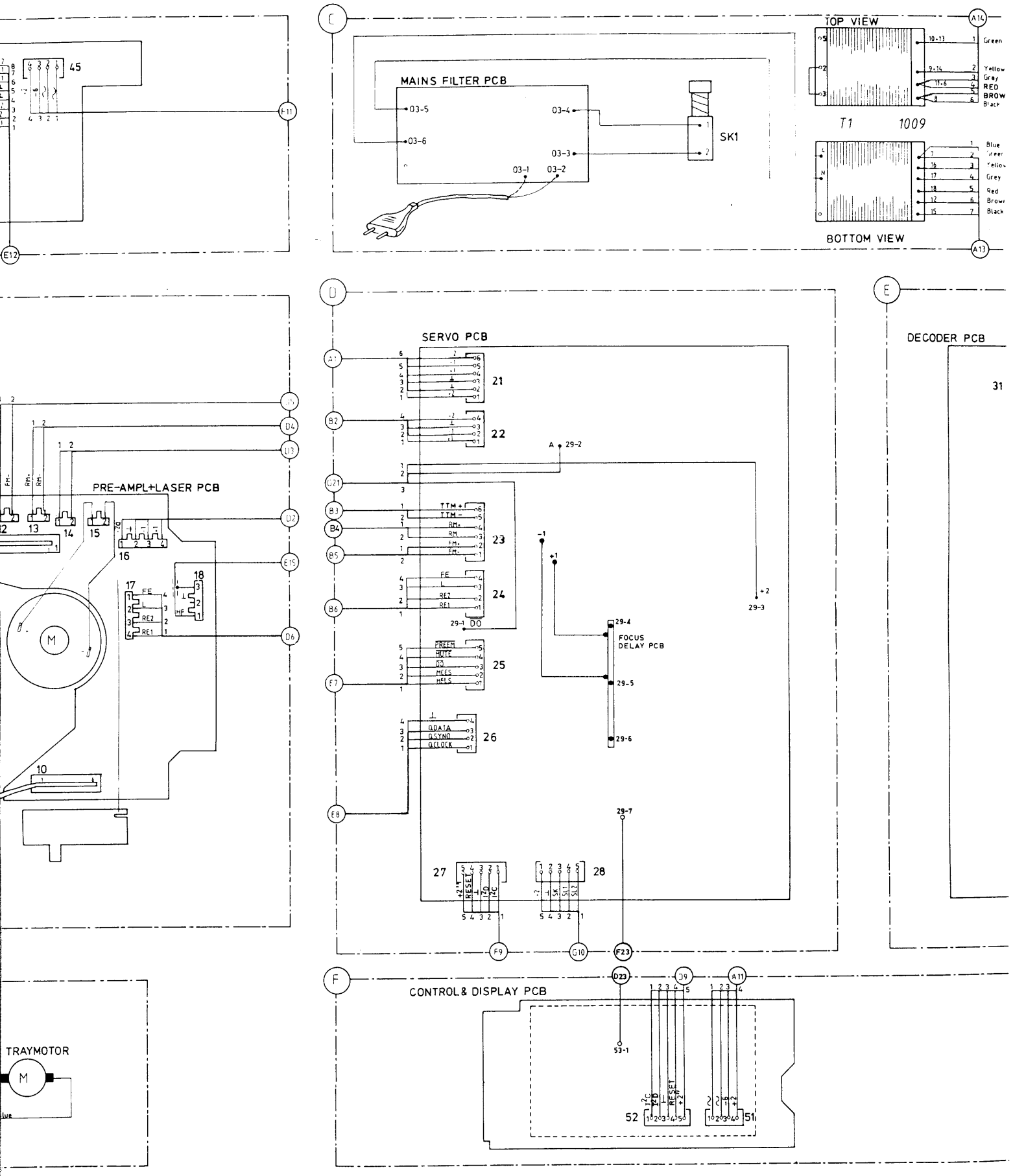

C
MAINS FILTER PCB
03-5
03-6
03-4
03-3
03-1
03-2

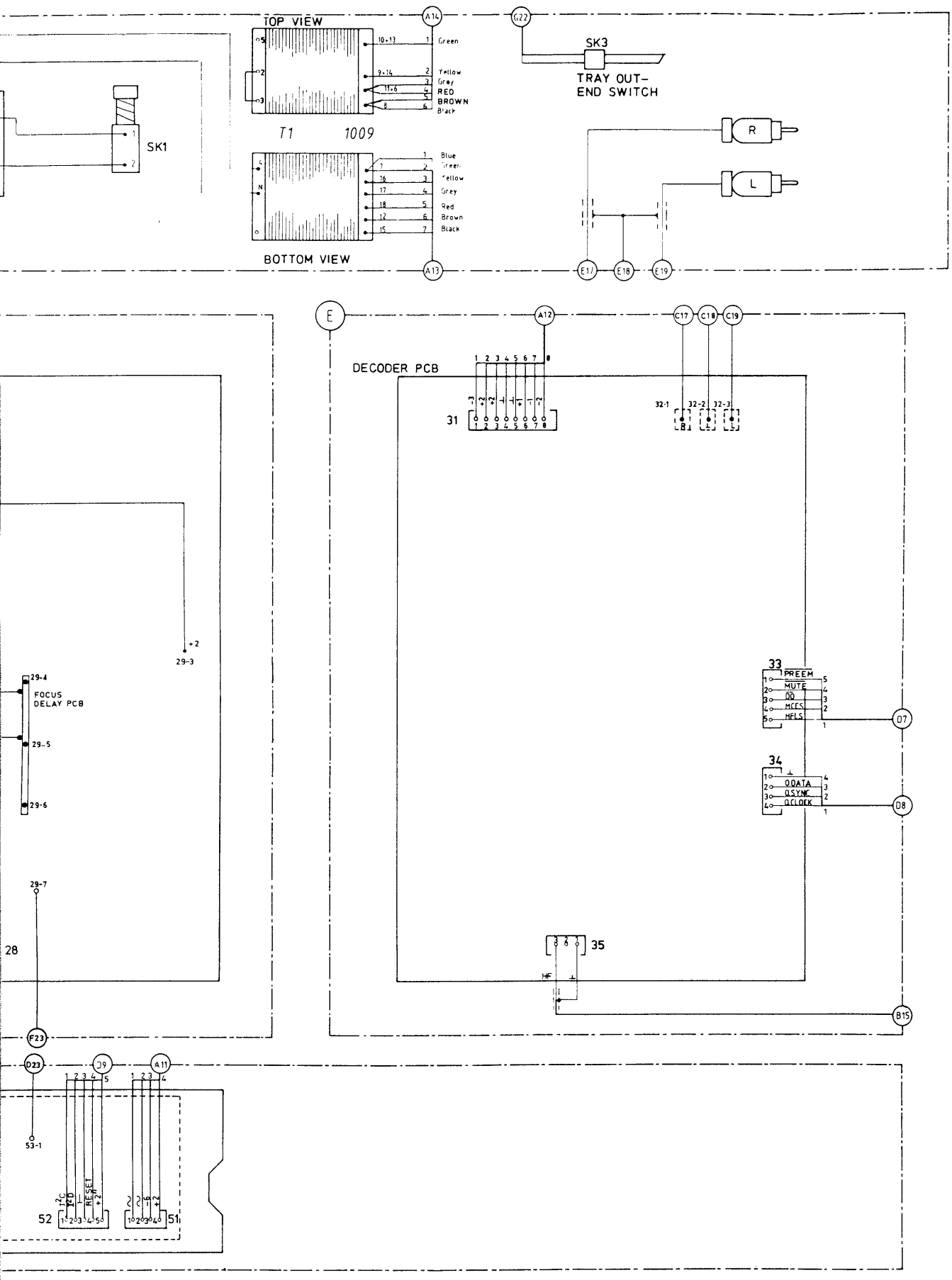

B
PRE-AMPL+LASER PCB
12
13
14
15
16
11
10
17
18
FE
RE2
RE1
M


D
SERVO PCB
21
22
23
24
25
26
27
28
TTM+
TTM-
RM-
RM
FM-
FM
FE
RE2
RE1
PREEM
MUTE
MCES
MFLS
QDATA
QSYNC
QCLOCK
RESET
SK
SCL
SDA
A 29-2
29-1
29-4
29-5
29-6
29-7
FOCUS
DELAY PC
D0
D23
F23

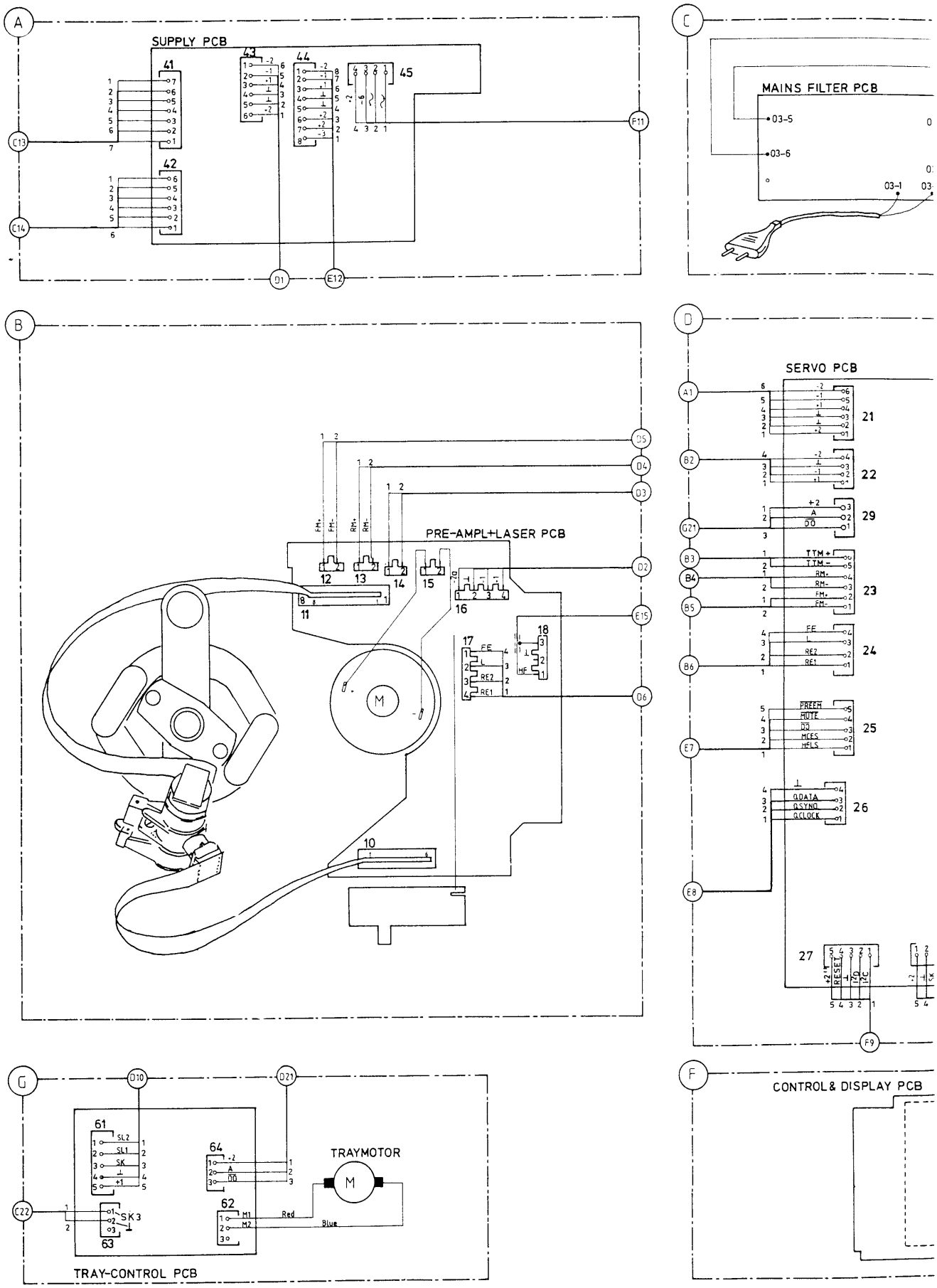

G
61
62
63
64
SL2
SL1
SK
SK3
TRAYMOTOR
M
Red
Blue
TRAY-CONTROL PCB

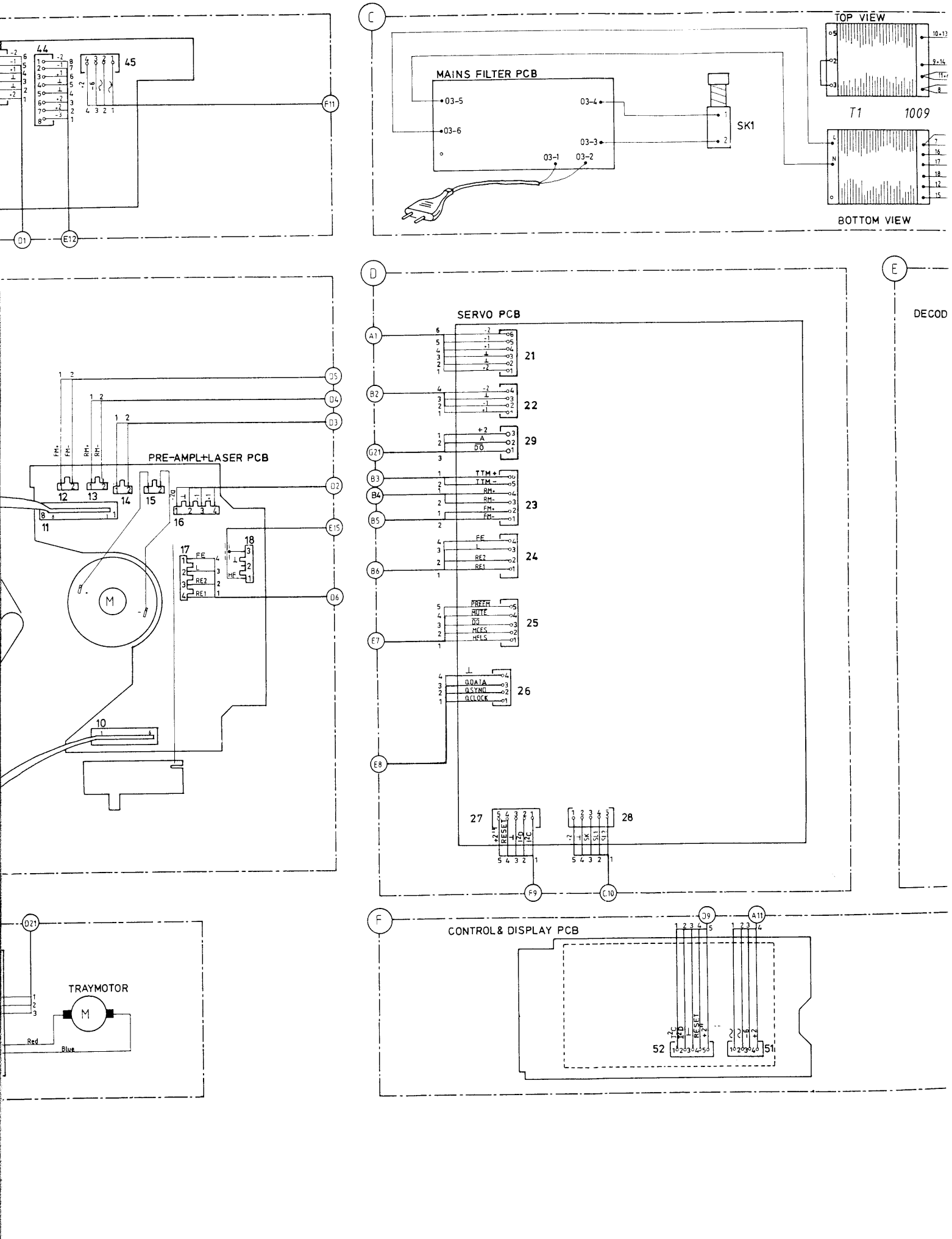

F
CONTROL & DISPLAY PCB
53-1
52

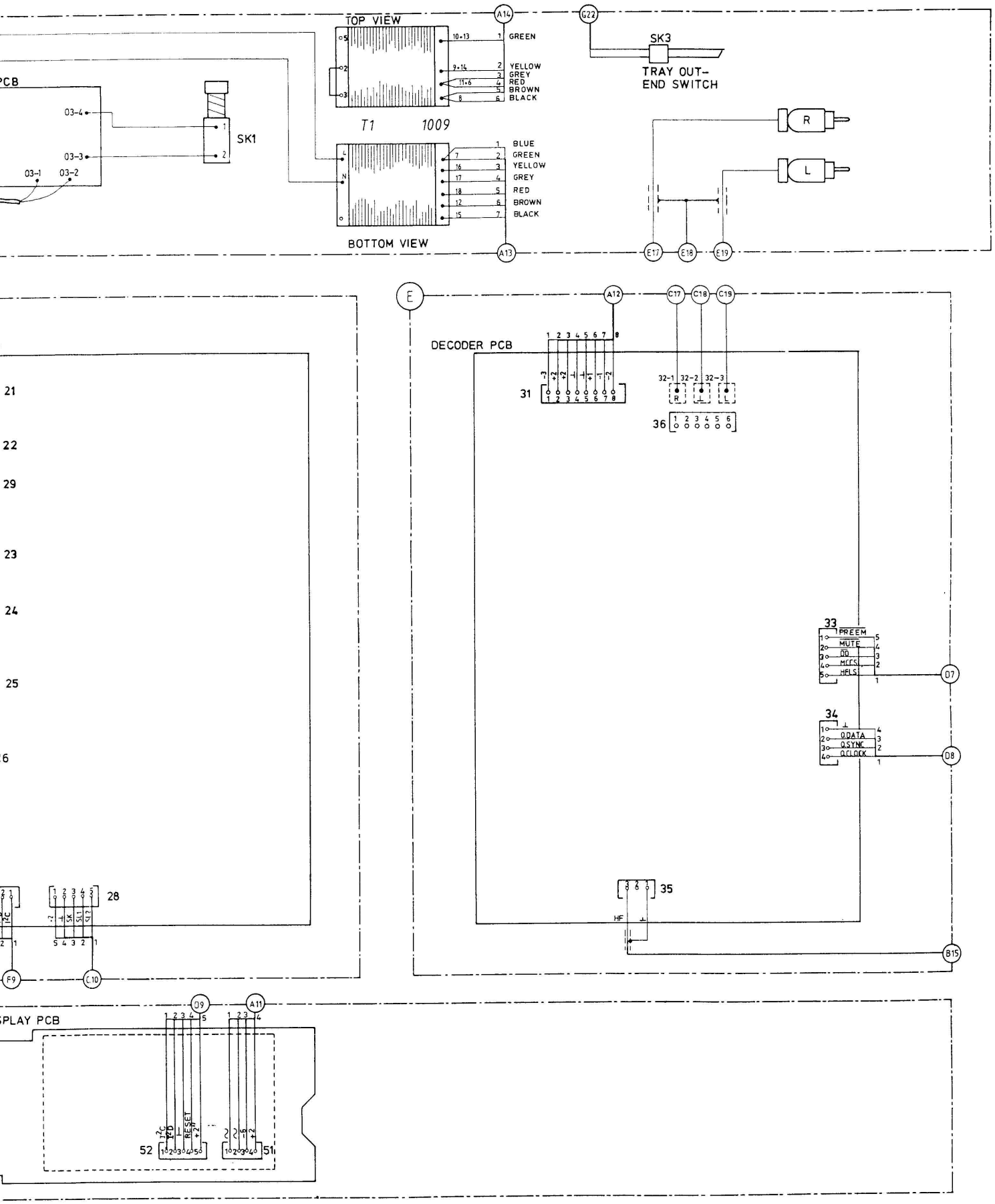

45
E12
F11
C
MAINS FILTER PCB
03-5
03-6
03-4
03-3
03-1
03-2
SK1
TOP VIEW
A14
10-13
9-14
11-6
Green
Yellow
Grey
RED
BROW
Black
T1
1009
Blue
Yellow
Grey
Red
Brown
Black
BOTTOM VIEW
A13
PRE-AMPL+LASER PCB
D4
D3
D2
E15
D6
FM-
RM+
RM-
12
13
14
15
16
17
18
FE
RE2
RE1
HF
M
10
D
SERVO PCB
A1
B2
C21
B3
B4
B5
B6
E7
E8
21
22
23
24
25
26
TTM+
TTM-
RM+
RM-
FM+
FM-
A 29-2
29-1
DO
-1
+1
+2
29-3
29-4
FOCUS
DELAY PCB
29-5
29-6
PREFM
MUTE
DO
MCES
MFLS
QDATA
QSYNC
QCLOCK
29-7
27
28
+2.4
RESET
I2D
I2C
SK
SL1
SL2
F9
G10
F23
E
DECODER PCB
31
F
CONTROL& DISPLAY PCB
D23
D9
A11
53-1
52
51
TRAYMOTOR
M


TOP VIEW
A14
G22
SK3
TRAY OUT-
END SWITCH
SK1
T1 1009
Green
Yellow
Grey
RED
BROWN
Black
Blue
Green
Yellow
Grey
Red
Brown
Black
BOTTOM VIEW
A13
R
L
E17
E18
E19
E
A12
C17
C18
C19
DECODER PCB
31
32-1
32-2
32-3
+2
29-3
29-4
FOCUS
DELAY PCB
29-5
29-6
29-7
28
33
PREEM
MUTE
OD
MCFS
MFLS
D7
34
QDATA
QSYNC
QCLOCK
D8
35
HF
B15
F23
D23
J9
A11
53-1
52
51
RESET

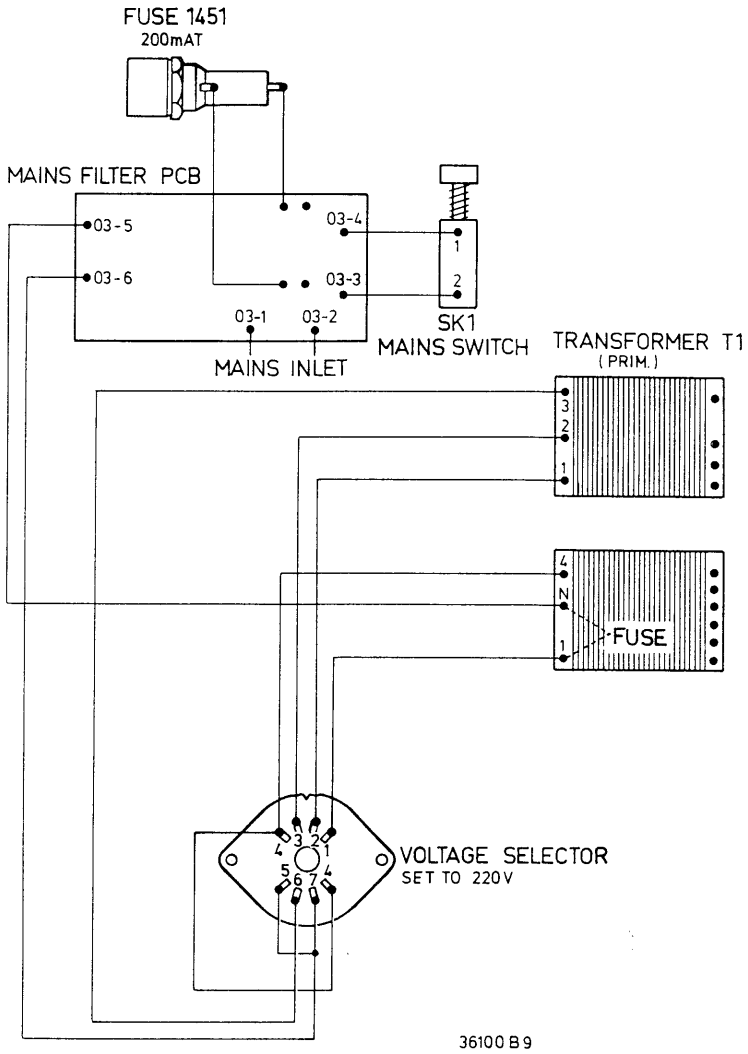
35 740 E11


A
SUPPLY PCB
41
42
43
44
45
C13
C14
D1
E12
F11
B
PRE-AMPL+LASER PCB
11
12
13
14
15
16
17
18
10
D2
D3
D4
D5
D6
E15
C
MAINS FILTER PCB
03-5
03-6
03-1
D
SERVO PCB
21
22
29
23
24
25
26
27
A1
B2
D21
B3
B4
B5
B6
E7
E8
F9
G
TRAY-CONTROL PCB
61
62
63
64
SK3
TRAYMOTOR
Red
Blue
C22
D10
D21
F
CONTROL& DISPLAY PCB


C
TOP VIEW
MAINS FILTER PCB
03-5
03-6
03-4
03-3
03-1
03-2
SK1
T1
1009
BOTTOM VIEW
44
45
F11
D1
E12
D
SERVO PCB
A1
B2
G21
B3
B4
B5
B6
E7
E8
21
22
29
23
24
25
26
27
28
F9
C10
E
DECOD
PRE-AMPL+LASER PCB
D5
D4
D3
D2
E15
D6
FM+
FM-
RM+
RM-
11
12
13
14
15
16
17
18
10
M
F
D21
TRAYMOTOR
Red
Blue
D9
A11
CONTROL& DISPLAY PCB
52
51


TOP VIEW
A14
G22
SK3
TRAY OUT-
END SWITCH
10+13 1 GREEN
9+14 2 YELLOW
3 GREY
11+6 4 RED
5 BROWN
8 6 BLACK
T1 1009
1 BLUE
7 2 GREEN
16 3 YELLOW
17 4 GREY
18 5 RED
12 6 BROWN
15 7 BLACK
BOTTOM VIEW
A13
SK1
03-4
03-3
03-1
03-2
R
L
E17
E18
E19
E
A12
C17
C18
C19
DECODER PCB
31
32-1
32-2
32-3
36
33
PREEM
MUTE
OD
MCFS
HFLS
D7
34
ODATA
OSYNC
OCLOCK
D8
35
HF
B15
21
22
29
23
24
25
6
28
F9
C10
D9
A11
SPLAY PCB
52
51
I²C
SCL
RESET
+2
+1

35 740 E11/A



Carbon film 0.2 W	70°C	5%	
Carbon film 0.33 W	70°C	5%	
Metal film 0.33 W	70°C	5%	
Carbon film 0.5 W	70°C	5%	
Carbon film 0.67 W	70°C	5%	
Carbon film 1.15 W	70°C	5%	

Ⓒ Chip component

Ceramic plate Tuning ⩽ 120 pF NP.0	2%
Ceramic plate Others	—20/+80%
Polyester flat foil	10%
Metalized polyester flat film	10%
Polyester flat foil small size (Mylar)	10%
Polysterene film/foil	1%
Tubular ceramic	
Miniature single	
Subminiature tantalum	± 20%

*a	= 2,5 V
b	= 4 V
c	= 6,3 V
d	= 10 V
e	= 16 V
f	= 25 V
g	= 40 V
h	= 63 V
j	= 100 V
l	= 125 V
m	= 150 V
n	= 160 V
q	= 200 V
r	= 250 V
s	= 300 V
t	= 350 V
u	= 400 V
v	= 500 V
w	= 630 V
x	= 1000 V
A	= 1,6 V
B	= 6 V
C	= 12 V
D	= 15 V
E	= 20 V
F	= 35 V
G	= 50 V
H	= 75 V
I	= 80 V

27 037A/C

Chips

1,5 pF	5%	4822 122 31792
1,8 pF	5%	4822 122 32087
3,3 pF	5%	4822 122 32079
3,9 pF	5%	4822 122 32081
4,7 pF	5%	4822 122 32082
8,2 pF	5%	4822 122 32083
10 pF	5%	4822 122 31971
18 pF	5%	4822 122 31769
22 pF	10%	4822 122 31837
27 pF	5%	4822 122 31966
33 pF	5%	4822 122 31756
39 pF	5%	4822 122 31972
47 pF	5%	4822 122 31772
56 pF	5%	4822 122 31967
68 pF	10%	4822 122 31961
82 pF	10%	4822 122 31839
100 pF	5%	4822 122 31765
120 pF	5%	4822 122 31766
150 pF	5%	4822 122 31767
180 pF	2%	4822 122 31794
220 pF	5%	4822 122 31965
330 pF	10%	4822 122 31642
390 pF	5%	4822 122 31771
470 pF	5%	4822 122 31727
560 pF	5%	4822 122 31773
680 pF	5%	4822 122 31775
820 pF	10%	4822 122 31974
1 nF	10%	5322 122 31647
1,2 nF	5%	4822 122 31807
1,5 nF	10%	4822 122 31781
2,2 nF	10%	4822 122 31644
2,7 nF	10%	4822 122 31783
3,3 nF	10%	4822 122 31969
4,7 nF	10%	4822 122 31784
5,6 nF	10%	4822 122 31916
6,8 nF	10%	4822 122 31976
10 nF	10%	4822 122 31728
12 nF	10%	5322 122 31648
15 nF	10%	4822 122 31782
18 nF	5%	4822 122 31759
22 nF	10%	4822 122 31797
33 nF	10%	4822 122 31981
100 nF	20%	4822 122 31947

Chips 0,125 W

0 E	jumper	4822 111 90163
1 E	10%	4822 111 90184
1,1 E	10%	4822 111 90377
1,2 E	10%	4822 111 90378
1,3 E	10%	4822 111 90379
1,5 E	10%	4822 111 90381
1,6 E	10%	4822 111 90382
1,8 E	10%	4822 111 90383
2 E	10%	4822 111 90384
2,2 E	10%	4822 111 90507
2,4 E	10%	4822 111 90385
2,7 E	10%	4822 111 90386
3 E	10%	4822 111 90387
3,3 E	10%	4822 111 90447
3,6 E	10%	4822 111 90389
3,9 E	10%	4822 111 90391
4,3 E	10%	4822 111 90392
4,7 E	5%	5322 111 90376
5,1 E	10%	4822 111 90393
5,6 E	10%	4822 111 90394
6,2 E	10%	4822 111 90395
6,8 E	5%	4822 111 90254
7,5 E	10%	4822 111 90396
8,2 E	10%	4822 111 90397

Chips 0,125 W

9,1 E	10%	4822 111 90398
10 E	5%	5322 111 90095
11 E	5%	4822 111 90338
12 E	5%	4822 111 90551
13 E	5%	4822 111 90343
15 E	5%	4822 111 90344
16 E	5%	4822 111 90347
18 E	5%	5322 111 90139
20 E	5%	4822 111 90352
22 E	5%	4822 111 90186
27 E	5%	4822 116 60186
30 E	5%	4822 111 90356
33 E	5%	4822 111 90357
36 E	5%	4822 111 90359
39 E	5%	4822 111 90361
43 E	5%	5322 116 90125
47 E	5%	4822 111 90217
51 E	5%	4822 111 90365
56 E	5%	4822 116 60187
62 E	5%	4822 111 90367
68 E	5%	4822 111 90203
75 E	5%	4822 111 90371
82 E	5%	4822 116 60158
91 E	5%	4822 111 90375
100 E	5%	5322 111 90091
110 E	5%	4822 111 90335
120 E	5%	4822 111 90339
130 E	5%	4822 116 60164
150 E	5%	5322 111 90098
160 E	5%	4822 111 90345
180 E	5%	5322 111 90242
200 E	5%	4822 111 90348
220 E	5%	4822 111 90178
240 E	5%	4822 111 90459
270 E	5%	4822 111 90154
300 E	5%	4822 111 90156
330 E	5%	5322 111 90106
360 E	1%	4822 111 90288
390 E	5%	5322 111 90138
430 E	2%	4822 111 90213
470 E	5%	5322 111 90109
510 E	5%	4822 111 90245
560 E	5%	5322 111 90113
620 E	5%	4822 111 90366
680 E	5%	4822 111 90162
750 E	5%	4822 111 90438
820 E	5%	4822 111 90171
910 E	5%	4822 111 90372
1 k	5%	5322 111 90092
1,1 k	5%	4822 111 90294
1,2 k	5%	5322 111 90096
1,3 k	5%	4822 111 90244
1,5 k	5%	4822 111 90151
1,6 k	5%	5322 111 90265
1,8 k	5%	5322 111 90101
2 k	5%	4822 111 90165
2,2 k	2%	4822 111 90248
2,4 k	5%	4822 111 90289
2,7 k	2%	4822 111 90569
3 k	5%	4822 111 90198
3,3 k	5%	4822 111 90157
3,6 k	5%	5322 111 90107
3,9 k	2%	4822 111 90571
4,3 k	5%	4822 111 90167
4,7 k	5%	5322 111 90111
5,1 k	5%	5322 111 90268
5,6 k	2%	4822 111 90572
6,2 k	5%	5322 111 90116
6,8 k	2%	4822 111 90544
7,5 k	5%	4822 111 90276
8,2 k	5%	5322 111 90118

Chips 0,125 W

9,1 k	5%	4822 111 90373
10 k	2%	4822 111 90249
11 k	5%	4822 111 90337
12 k	2%	4822 111 90253
13 k	2%	4822 111 90509
15 k	5%	4822 111 90196
16 k	5%	4822 111 90346
18 k	5%	4822 111 90238
20 k	5%	4822 111 90349
22 k	2%	4822 111 90251
24 k	2%	4822 111 90512
27 k	2%	4822 111 90542
30 k	2%	4822 111 90216
33 k	5%	5322 111 90267
36 k	2%	4822 111 90514
39 k	5%	5322 111 90108
43 k	5%	4822 111 90363
47 k	2%	4822 111 90543
51 k	5%	5322 111 90274
56 k	2%	4822 111 90573
62 k	5%	5322 111 90275
68 k	5%	4822 111 90202
75 k	2%	4822 111 90574
82 k	2%	4822 111 90575
91 k	5%	5322 111 90277
100 k	2%	4822 111 90214
110 k	5%	5322 111 90269
120 k	2%	4822 111 90568
130 k	2%	4822 111 90511
150 k	5%	5322 111 90099
160 k	2%	5322 111 90264
180 k	2%	4822 111 90565
200 k	5%	4822 111 90351
220 k	5%	4822 111 90197
240 k	2%	4822 111 90215
270 k	5%	4822 111 90302
300 k	5%	5322 111 90266
330 k	2%	4822 111 90513
360 k	2%	4822 111 90515
390 k	5%	4822 111 90182
430 k	5%	4822 111 90168
470 k	5%	4822 111 90161
510 k	5%	4822 111 90364
560 k	5%	4822 111 90169
620 k	2%	4822 111 90213
680 k	2%	4822 111 90106
750 k	5%	4822 111 90369
820 k	5%	4822 111 90205
910 k	5%	4822 111 90374
1 M	2%	4822 111 90252
1,1 M	5%	4822 111 90408
1,2 M	10%	4822 111 90409
1,3 M	10%	4822 111 90411
1,5 M	10%	4822 111 90412
1,6 M	10%	4822 111 90413
2 M	10%	4822 111 90415
2,2 M	10%	4822 111 90185
2,4 M	10%	4822 111 90416
2,7 M	10%	4822 111 90417
3 M	10%	4822 111 90418
3,3 M	10%	4822 111 90191
3,6 M	10%	4822 111 90419
3,9 M	10%	4822 111 90421
4,3 M	10%	4822 111 90422
4,7 M	10%	4822 111 90423
5,1 M	10%	4822 111 90424
5,6 M	10%	4822 111 90508
6,2 M	10%	4822 111 90426
6,8 M	10%	4822 111 90328
7,5 M	10%	4822 111 90427
8,2 M	10%	4822 111 90329
9,1 M	10%	4822 111 90428

FAULTFINDING METHOD

Preface

In course of the development of the troubleshooting guide for the Compact Disc it has become clear that a different approach from the one applied so far was required.
For, it is no longer possible to use the classic strategy, i.e. basing the troubleshooting method on a number of possible faults in the unit.
Practice has shown that a certain fault, with the associated symptom, can have a wide variety of causes.
The reason is that this player incorporates a number of feedback loop configurations — which, moreover, might affect each other — and this impedes the obvious measurements.

The method below divides the player from diagram point of view into nine clearly distinguishable sub-groups and by performing some measurements, the sub-group being in failure can be isolated. Later the defective circuit can be further examined according to the method given.

PRACTICAL HINTS

Test discs

It is important to handle the test discs with great care.
For, the troubles (black dots, fingerprints, etc.) are exclusively and unambiguously positioned.
Damage can cause additional drop-outs etc. and as a result the conscious fault on this disc is no longer exclusive.
In that case it is no longer possible to check e.g. whether the track detector is working correctly.

Measurements on op-amps

In the electronic circuits of the servo systems op-amps are frequently being applied. These op-amps can be used as amplifiers, as filters, as invertors, as buffers, etc.

In those cases where feedback is applied in one way or the other, the voltage difference at the differential inputs inclines to zero. This applies both to DC and to AC.
The cause can be traced back to the properties of an ideal op-amp ($Z_i = \infty$; $G = \infty$; $Z_o = 0$).
In practice this means that it is nearly impossible to perform measurements on the inverting and non-inverting inputs of op-amps if one input is directly connected to ground.
In those cases only the output signal will be measurable.

That is why in most cases no AC voltages can be given to the inputs.
The DC voltages at the inputs are equal.

Stimulating with „0" and „1"

In the troubleshooting method certain pins should in a number of cases be connected to ground or be connected to the power supply voltage.
This way of acting offers the possibility to overrule certain circuits and to stimulate others.
In this way the diagnose time can be reduced.

In a number of cases the relevant pins appear to be **op-amp outputs.**

In this respect it should be mentioned that the outputs of the used op-amps are short-circuit protected.
This implies that the output of an op-amp can be made low (= usually ground potential) without consequences.
On the other hand should be pointed out that it is **not allowed** to connect the **output** of an op-amp directly to the **power supply voltage.**

I/0s of microprocessors should not be connected directly to power supply voltage.
These I/0s are allowed to be brought to „0" in case this is mentioned explicitly.

Selection of ground point

It is very important to select a ground point as close as possible to the test point.

Conditions for injecting

— It should be pointed out that injection of levels or signals from a strange source is **never** allowed to occur when the power supply voltage is lacking in the circuit in question.
— Naturally, the injected level is never allowed to exceed the power supply voltage of the circuit in question.

Continuous burning of the laser

— Disconnect plug 24 on the servo PCB and connect pin 24-3 (laser) of the cable connector to ground.
Now the focus loop and the radial loop are interrupted as well:
24-1 (RE1 = Radial Error 1), 24-2 (RE2 = Radial Error 2) and 24-4 (FE = Focus Error).
The laser also burns continuously when the set is in service loop A.

Irregular working of the display

Irregular working of the display when the set is opened and playing, might have been caused by incidental body effect in the region of the crystal oscillators.
Switching „off" and „on" of the mains voltage will eliminate this effect.

Indication of checkpoint

In the circuit diagram and PCB diagrams the checkpoints have been given a serial number (e.g. ⟨12⟩), to which the troubleshooting method will refer.
For oscillograms, amplitudes, time bases and position of set, see tables of checkpoints.

GENERAL CHECKPOINTS

In the detailed troubleshooting method following below a number of general conditions, required for proper functioning of the player, will **not** be repeated.
Before starting the detailed troubleshooting method these general points should be checked.

a. Ensure that disc and objective are clean (remove dust, fingerprints, etc.) and use undamaged discs.
b. Convince yourself of the presence of the clock frequencies, viz.:
   - 6 MHz for μP servo (pin 16)
   - 4.233600 MHz for CIM-IC (pin 8)
   - 4.35 MHz for free-running PLL circuit on the DEMOD IC (pin 22) in pos. play
   - 6 MHz for control and display μP (pin 15)
c. Check whether all power supply voltages are present and have the correct level.
   See PCB drawings.
d. Check whether the two mutes (KILL and $\overline{\text{SMSE}}$) are inactive so that data are nowhere interrupted.
   KILL = the collector of transistor 6536 on the decoder PCB.
   This should go high about 3 seconds after the mains voltage is switched on.
   $\overline{\text{SMSE}}$ = pin 39 of the ERCO IC on the decoder PCB.
   Normally this pin is high during play and low during search.

e. Check good working of both microprocessors by means of their built-in self-check program and possible periferal check program.

Method

Self-check of the servo μP

- Disconnect points 2, 3 and 17 of the display μP.
- Interconnect pins 6, 14, 18 and 21 of the socket of the servo μP.
- When the μP functions properly, pin 22 should go from "0" to "1" within 1 second after switch-on of the mains voltage.

Self-check of the display μP

- Take the servo μP out of its socket and ensure points 2, 3 and 17 of the display μP are connected.
- Interconnect pins 6, 14, 18 and 21 of the display μP.
- If the μP is functioning properly, pin 22 should go from "1" to "0" within 1 second after switch-on of the mains voltage.

Periferal check

Place disc on turntable and switch off mains voltage.

Initiating service loop A

Ensure that the tray PCB is mounted or that the tray in-end switch (SK2) on the tray PCB is closed when the drawer is closed.
Keep the NEXT, STOP/CM and PAUSE keys depressed during switch-on of the mains voltage. Release the keys after 2 seconds.
Now the player is in the SERVICE LOOP A.
This means that the laser is working, the focusing control is working and the turntable motor is running while the light pin settles itself against the inner stop (i.e. constantly remains in the lead-in tracks).
The radial servo system is switched off.
In this service loop the LEDs and the display can be checked as follows:

The display will indicate 00—0102 and increase towards the left.
If now the SEARCH reverse key is depressed, the REPEAT, ERROR and PAUSE leds will light up after 2 clock strokes of the display. The set remains in service loop A. When the SEARCH reverse key is pressed again, the set will resume the initial position.

Initiating service loop B

Service loop B can be reached from service loop A by pressing the SEARCH forward key. In service loop B the display continues to indicate the same as in service loop A, except for the play/program bar. Furthermore the REPEAT led will light up.
After approx 1 minute music can be heard. (The time depends on the length of the lead-in track).
From service loop B the set can be brought to the position of normal end use by pressing the START/REPLAY key when one of the musical numbers on the disc is being displayed.
If the START/REPLAY key is operated when the display shows a musical number that is not on the disc, the set will stop and two horizontal bars will appear on the display.

f. Eye pattern
Check on the oscilloscope whether the H.F.-signal — called eye pattern.
Set for this purpose the time basis of the oscilloscope to 0,5 μs and check test point ◇65◇ (on the decoder PCB).

This picture is fairly stable if PLL circuit is in lock and turntable loop is controlling correctly.
A vibrating or **unstable eye pattern** can be caused by a poor turntable motor, or by bringing the set in **service loop A.**

DETAILED TROUBLESHOOTING METHOD

A number of quick and efficient checks immediately give a definite answer on poorly functioning sections of the player.
To check the servo systems two service loops have been built in μP 6201.
Before calling in service loop A or service loop B, it should be checked (position power on) whether the bus (clock, data; pin 3 and 2 of μP 6201 resp.) is free. In other words, checking whether these lines do not have a short circuit to ground or supply voltage (level low or „high"). In such a case the buttons cannot be operated.
For troubleshooting the step-by-step method below is followed.

First step (with disc on turntable)

Bring the player in service loop A.
If one of the conditions for service loop A is not met, the questions below should be answered positively **in the sequence given**.

Mostly this means that when one question has been answered positively, all the preceding circuits, to which the questions refer, are functioning well.

Example: if the eye pattern is present, we may conclude that the laser is working, the laser is in focus and that the turntable motor is running.

Note:
In some situations, certain faults in the radial servo circuit affect the focus servo circuit (e.g. if supply voltage +1 of IC6214 in the radial circuit fails, the focus coil starts oscillating).
To determine if this situation exists, connect point ◇36◇ on the servo PCB to ground.
In this way, the influence of the radial servo circuit on the focus servo circuit can be eliminated.

A. Is the laser giving light?
(Test method: see sub A).

B. Is the angle disc-light pin within the tolerance, i.e. 90° ± 0,5°?
(Test method: see description mentioned in chapter "Mechanical measurements and adjustments" of the C.D.M. manual).

C. Is the laser giving sufficient light?
(Test method: see sub C).

D. Does the objective come in focus?
(Test method: see sub D).

E. Is the turntable motor running and, if so, is it running at the correct speed?
(Test method: see sub E).

If the answers to questions A through E are positive, it should be possible to bring the player in service loop A.

Second step (with disc on turntable)

Bring the player in service loop B.
This means that the eye pattern on point ◇65◇ (on the decoder PCB has to be stable, while MCES on point ◇17◇ on the servo PCB has to be more stable too).

Note that the set is not only tracking a song in loop B, but also playing the song, provided the digital circuit is working.

If this does not work, return to service loop A and answer the questions below positively in the sequence given.

tween 25 Hz and 60 Hz at 2 V_{pp} by means of an AF generator ($Z_i \leq 600\ \Omega$). The exact frequency is player-dependent.
— Select such a frequency that the monitor diodes of the light pin give output signals as indicated on test points ◇5◇, ◇6◇, ◇7◇ and ◇8◇.
— Check test points ◇9◇, ◇10◇, ◇11◇ and ◇12◇.
— Check test point ◇13◇.
— Check test point ◇14◇.

Is the same as signal on test point ◇13◇ but amplitude is dependent on position of potentiometer R3158.

If all the checks are positive, close focus loop (insert plug 24). Now the focusing circuit should be able to operate. Reconnect transistor 6230.
It should be noted here that the amplitudes on test points ◇5◇ through ◇13◇ are slightly dependent on the characteristic of the monitor diodes.

Sub. E. IS TURNTABLE MOTOR RUNNING AND, IF SO, IS IT RUNNING AT THE CORRECT SPEED?

Test method (Test points on servo PCB)

— Place disc on turntable and bring set in service loop A.
— If focusing point is found, check whether FCO is low on point ◇15◇.

If not, check focus circuit sub D.
If so, proceed.

— Now only power on, disconnect plug 25 on the servo PCB and check MCES= point 2 of cable connector 25 or point ◇66◇ on the decoder PCB see figure F.
If not, check DEMOD and ERCO circuit, see sub L.
If so, proceed.
— Reconnect plug 25, disconnect plug 15 on the pre-amplifier PCB and inject a DC signal to the cable connector of the motor or directly to the turntable motor.
The turntable motor should be running now.
(A DC voltage of 2,5 V approximately corresponds with the rpm during scanning of the innermost tracks).
In this condition the player should be brought in service loop A (depress Stop button while mains voltage is switched on).
If DC < 2,5 V Figure G should be visible on test point ◇17◇ (servo PCB).

If DC > 2,5 V Figure H should be visible on test point ◇17◇.

If so, check turntable control circuit (circuit from point ◇17◇ to turntable motor).
If not, check whether MCES is released by means of FCO at pin 13 of IC6205C.
This can be done by disconnecting plug 25 on the servo PCB and measure on point 2 of cable connector 25.
If MCES is working now, check circuit around IC 6205C.

— Reconnect plug 25.
— Take player out of service loop A, depress Power-on button and then Play button and check eye pattern on point ◇65◇ (on decoder PCB).

To stabilize the eye pattern, bring light pin above tracks by hand, or by briefly (5 s) depressing Fast Forward button.
If eye pattern on point ◇65◇ is not present or unstable, check RF pre-amplifier (see Annex V).
— If eye pattern is correct, proceed.
— Check whether point ◇55◇ (= HFLS) on the servo PCB is correct in service loop A (see Figure Y). If not, check HFLS detector circuit (is circuit between point ◇65◇ and ◇55◇). If so, proceed.

Take player out of service loop A by depressing the power button.
— Check locking-in of PLL circuit of DEMOD-IC. See Annex II. Checking locking-in of PLL circuit.
If PLL is locking-in, proceed.
— Check timing signals on output of DEMOD IC as indicated in sub L.
Is the digital decoder circuit functioning according to specification? If timing signals are correct, proceed.
— If MCES is still not functioning properly, replace the relevant specific digital IC.
— MCES has to be present now.

Sub. F. ARE THE $\overline{DO}$ AND HFLS DETECTORS FUNCTIONING?

Test method (Test points on servo PCB)

— Starting point is:
HFLS = 1 when spot is exactly on track
HFLS = 0 between tracks (e.g. during track jumping)
$\overline{DO}$ = 0, or DO = 1 in case of drop-out
$\overline{DO}$ = 1, or DO = 0 when there is no drop-out.

Approximative method
(applicable in service loop A)

— Place disc on turntable.
— Bring player in service loop A.
— Check whether DO (test point ◇57◇ is not continuously „high". Normally test point ◇57◇ is „low"; however small spikes of approximately 100mV are present in case of scratches on the disc.
— Check HFLS (test point ◇55◇).

Precise method
(can be checked in playing set only)

— Place test sample 5A (4822 397 30096) on turntable. Switch power on and depress Play button.
— Select track no. 10: Check point ◇55◇.
HFLS pulses should be present.
— Select track no. 15: Check point ◇56◇.
$\overline{DO}$ pulses should be present. With this track the HFLS pulses on point ◇55◇ should also be present.
— In case of track jumping HFLS pulses are always present on point ◇55◇.

Sub. G. IS TRACK DETECTOR FUNCTIONING WELL?

Test method (Test points on servo PCB)

Switch off the offset circuit:
Loosen resistor 3335 (at the side where it is in contact with pin 14 of IC6215).
Mount a 47 kΩ trimming potentiometer between +1 and —1 supply voltage (for example between pins 4 and 11 of IC6215). Connect the wiper of the trimming potentiometer to the loose side of resistor 3335.

— Place a disc on the turntable.
— Bring the set in service loop A.
— Adjust the signal on test point ◇21◇ symmetrically round 0 V by means of the external 47 kΩ trimming potentiometer. The amplitude of the signal may change during this adjustment.
— Measure F.S. on point ◇36◇.

Here too the frequency variation depends on the eccentricity of the disc.

— Check point ◇60◇.
— Check point ◇61◇. Signal cannot be triggered.
— Check point ◇62◇.
— Switch the offset circuit on again.

Sub. H. IS THE RADIAL CONTROL FUNCTIONING PROPERLY?

Attention: The offset circuit (d-multiplier) and the AGC circuit (k-multiplier) are correction circuits. This means that under optimal conditions (new disc, minimum tolerances of components) the set may be working properly even if a fault is present in offset or AGC circuit.

Test method (Testpoints on servo PCB)

a. Place disc on turntable.
b. Switch off AGC circuit (k-multiplier) and switch off offset circuit (d-multiplier).

Method:
Switching off AGC circuit: interconnect points 5 and 6 of IC 6216.

Switch off the offset circuit:
Loosen resistor 3335 (at the side where it is in contact with pin 14 of IC6215).
Mount a 47 kΩ trimming potentiometer between +1 and —1 supply voltage (for example between pins 4 and 11 of IC6215). Connect the wiper of the trimming potentiometer to the loose side of resistor 3335.
— Place a disc on the turntable.
— Bring the set in service loop A.
— Adjust the signal on test point ◇21◇ symmetrically round 0 V by means of the external 47 kΩ trimming pot. The amplitude of the signal may change during this adjustment.

c. Bring set in service loop B.
At this moment there is a high probability that the set is working.
If so, check b and d factor (see Annexes IV and III).

If not, proceed.

d. Bring set in service loop A and check signal on point ◇21◇.

The AC-component has to be 12-14 V symmetrically, around a DC level of zero volt.
If this is correct, proceed to e).
If this is not correct check following testpoints

◇22◇, ◇23◇ : value should be 0.7 V_{pp}
◇24◇ : value should be 0.2 V_{pp}
◇25◇ : value should be 0.25 V_{pp}
◇26◇ : value should be 20 mV_{pp}
◇27◇, ◇28◇ : value should be 800 mV_{pp}

Note:
The frequency variation strongly depends on the eccentricity of the disc.

If points ◇22◇ ÷ ◇28◇ are OK, check point ◇21◇ again.

If ◇21◇ is OK, proceed.

e. Check point ◇29◇ (is RE +650 Hz).

Value should be 6 V_{pp}. If so, proceed.
When the set is in the normal stand-by position 650 Hz at 300 mV is present on point ◇29◇.

f. To check radial output stage, do not use a disc, only power on. Inject on points ◇30◇ and ◇31◇ respectively a sine-wave signal of 8 to 10 Hz 3 V_{pp}.
Then the radial motor will go back and forth.

At this moment radial tracking must be possible in service loop B.
— Switch the AGC circuit on again.
If the original fault symptom is still present proceed to Annex IV:
Check of the k-factor.
— Switch the offset circuit on again.
If the original fault symptom is still present, proceed to Annex III:
Check of the d-factor.

Sub. I. IS THE P-BIT FUNCTIONING?

Test method (Test points on decoder PCB)

Bring the set in service loop B again. Between 45 and 95 seconds after the beginning of the disc the P-bit (pin 5 of the demod on the decoder PCB) should briefly go "high". This can be measured with an oscilloscope in DC position and 2 V/div.

Sub. J. IS INFORMATION TRANSMISSION SUBCODE FUNCTIONING? (Testpoints on servo and decoder PCB)

Test Method

Bring player in service loop B.
Check if activity is present on the bus (pins 2 and 3 of the μP IC6201 and 2 and 3 of port extender IC6202), i.e. the signal is not continuously high or low.

If not, check test points ◇72◇, ◇73◇, ◇74◇, ◇75◇, ◇95◇ and ◇96◇ and their interrelations (trigger oscilloscope at point ◇72◇).

In order to measure test points ◇75◇, ◇95◇ and ◇96◇ either the STOP or START key have to be depressed.

Sub. K. IS T1 FUNCTIONING, I.E. POLARITY OF RE? (Measure points on servo PCB)

Test method

Bring player in service loop B and measure T1 on pin 13 of μP servo IC6201.
A square-wave voltage (0-5V) should be measured on this pin. As a result of the frequency variation this square-wave is hard to trigger.

Sub. L. IS THE DIGITAL DECODER CIRCUIT FUNCTIONING ACCORDING TO SPECIFICATION?

Test method (Test points on decoding PCB)

— First condition is that the main motor is running at the correct speed. This implies that the PLL circuit is functioning properly. If not, apply test method sub E.
— Second condition is that the RF pre-amplifier is functioning properly. See for this purpose Annex V — Test method RF pre-amplifier.
— Apart from the data outputs, which can in principle not be measured when the unit is playing, a number of communication lines, responsible for timing, can be measured. In this way it is also possible to isolate faults in the „periphery" of the specific digital ICs. Tnese signals can be verified with a normal oscilloscope.
To data outputs the following applies:
  — In a playing unit it is only possible to check whether data are **present** or not.
  — In a non-playing unit measurements **can** be performed in a number of cases. See the Tables for this purpose.

F Are $\overline{DO}$ and HFL detectors functioning?
(test method: see sub F)

G. Is track detector functioning well?
(test method: see sub G)

H. Is the radial control functioning properly?
(test method: see sub H)

If the answers to questions F, G and H are positive, it should be possible to bring the player in service loop B.

Third step (with disc on turntable)

Release the set from service loop B by pressing the START/REPLAY key on the display during playback of a musical number that is present on the disc.
Note that the set is not only tracking a song in loop B, but also playing the song, provided the digital circuit is working.

If this does not work, return to service loop B and answer the question below positively.

I. Is the P-bit functioning?
(test method: see sub I)

J. Is information transmission subcode functioning?
(test method: see sub J)

K. Is T1 functioning, i.e. polarity of RE?
(test method: see sub K)

If the answers to questions I, J and K are positive, it should be possible to bring the player in the Play mode.

Fourth step (with disc on turntable)

If no music is heard in position „play" answer the last question.

L. Is digital decoder circuit functioning according to specification (test method: see sub L).

Sub. A. IS THE LASER GIVING LIGHT?

Test method

Bring the player in service loop A without placing a disc on the turntable. Now the laser is giving light for an unlimited period of time.

Another method for which the laser gives light during an unlimited period of time and the objective is **standing still,** is disconnecting plug 24 on the servo PCB and connecting point 24-3 of the cable connector to ground.
In case of power-on the laser should burn. This is checked with the aid of a light-sensitive component which is slightly screened from ambient light.

Hereafter follow some examples:

a. Connect photosensitive diode type BPW34, code number 4822 130 32108, with correct polarity to an **analogue** multimeter (e.g. PM2412) at range 10 kΩ.
If the laser is burning, the meter will give virtually full scale deflection.

b. Connect LDR, code number 4822 116 10002, to digital multimeter PM2517E.
If the laser is burning, the resistance will drop to approx. 8 kΩ.

If the laser is **not** giving any light, proceed to Annex I.

Sub. C. IS THE LASER GIVING SUFFICIENT LIGHT?

Test method (Test points on Pre-amp PCB)

— Interrupt the collector of TS6230 on the servo PCB or ground the - side of electrolytic capacitor 2209. Disconnect plug 24 on the servo PCB and connect pin 24-3 (laser) of the cable connector to ground.
Now the laser should continue to give light while FE, RE1 and RE2 are interrupted.
— Place disc on turntable and switch power on.
— Directly inject with AF generator ($Z_i \leqslant 600$ Ohms) to test point ⟨1⟩ FE a sine-wave signal between 25 and 60 Hz (exact frequency is player-dependent) and 2 V_{pp}.
— Select such a frequency that the monitor diodes of the light pin give output signals as indicated on test points ⟨5⟩, ⟨6⟩, ⟨7⟩ and ⟨8⟩. Amplitude 40 - 80 mV.
— If the amplitude is not sufficient, proceed to Annex I.

Sub. D. IS THE OBJECTIVE COMING INTO FOCUS?

Test method

- **No disc on turntable**

Switch power on and actuate Play button.
Now the arm should move inwards. Immediately after that the objective should move two times up-and downwards (this happens during searching of the focusing point).
After this the action will stop.
These actions are software-controlled from the servo μP.
If this is not working, check μP servo, end stage focus circuit or focus coil.

- **With disc on turntable**

Quick test procedure:

For a rough check on the working of the focus circuit, proceed as follows:
— place disc on turntable.
— set player in service loop A.
— remove disc from turntable.
— now examinate if the objective focuses by bringing a reflective object (e.g. mirror) above it.

Detailed test procedure

— Check TS6230 (on servo PCB) as follows:
Check whether FN becomes, with each passage of the nominal focusing **low for a short period of time**. Only when focusing point FN has been found, FE will be released via TS6230 (base will become negative).
Check whether base of TS6244 is driven low from servo μP (= FCO). If not, check servo μP.
If so, proceed.

— Test focusing circuit as follows:
Interrupt the collector of 6230 on the servo PCB and disconnect plug 24 on the servo PCB. Connect pin 24-3 (laser) of the cable connector to ground.
Now the laser is burning continuously, FE has been released and the focus loop has been interrupted at test point ⟨1⟩ (= FE) on servo PCB, circuit diagram C.

Testing of circuit, between test point ⟨1⟩ and focusing coil (Test points on servo PCB)

— Directly inject a sine-wave signal of 10 Hz, $2V_{pp}$, to test point ⟨1⟩ by means of an AF generator ($Z_i \leqslant 600\ \Omega$).
— Check visually whether focusing coil — and thus objective too — responds.
— Check whether this voltage is 0.6 V_{pp} on test point ⟨2⟩.
— Check whether this voltage is 6 V_{pp} on test point ⟨3⟩.
— Check whether this voltage is 5 V_{pp} on test point ⟨4⟩.

Testing the subchassis (Test points on Pre Amp PCB, injection point on servo PCB)

— Place a disc on the turntable.
— Directly inject to test point ⟨1⟩ a sine-wave signal be-

Measurements:

DEMOD:

For mode of player (Play, Stop) see Table.

— Check clock on test point ◇71◇. Test-point ◇71◇ synchronises when PLL is locking in. To check locking-in see Annex II.
— Trigger oscilloscope with signal on point ◇72◇ (= FSDE) and measure points ◇76◇, ◇77◇, ◇78◇ and their interrelations.

ERCO:

For mode of player (Play, Stop) see Table.

— Check point ◇94◇.
— Check test point ◇79◇.

  If this is good, trigger oscilloscope with point ◇79◇ (=FSEC).

— Measure points ◇80◇ and ◇81◇ and their interrelations.
— Check UNEC (= test point ◇82◇).

  Place test disc „test sample 5A" on turntable, select track no. 17 and verify test point ◇82◇.

Important:

If UNEC (test point ◇82◇) remains continuously „high", the fault is probably located in the DEMOD IC or the ERCO IC, or the RAM IC.
If the UNEC output is functioning normally, and there still is no music, the fault is probably located in the CIM IC, the FIL IC or the DAC IC.

CIM:

For mode of player (Play, Stop) see Table.

— Check point ◇94◇.
— Check test point ◇84◇.

  If this is good, trigger oscilloscope with point ◇84◇ (= STR1 = pin 12 of CIM-IC).

— Measure points ◇85◇, ◇86◇, ◇87◇ and their interrelations.

FIL:

For mode of player (Play, Stop) see Table.

— Check point ◇94◇.
— Check test point ◇84◇.

  If this is good, trigger oscilloscope with point ◇84◇ (= STR1)

— Measure point ◇93◇.
— Measure points ◇90◇, ◇91◇ and ◇92◇ and their interrelations.

DAC:

In the Play mode the analogue (music) signal is present on the outputs of opamps 6523 (left) and on the outputs of opamps 6525 (right).
If necessary, check KILL relay.

Annex I: LASER IS GIVING NO OR INSUFFICIENT LIGHT

Together with the laser supply and the monitor diode the laser forms a feedback system.
A defect in the laser supply might thus result in destruction of the laser. Replacement of the laser (= new light pin) will not solve anything. The new laser will also be destroyed since the original fault in the laser supply is still present.

On the other hand it is impossible to check and repair a feedback system when one link is missing.

For this reason the so-called laser simulator 3 is supplied. Code number 4822 395 30229.
This laser simulator consists of a PCB which contains the laser and monitor simulation, a switch to test the On/Off position and a number of sockets.

This PCB can be connected to the laser supply instead of the light pin so that the feedback system is closed.

Repair procedure:

Since the light pin is very sensitive to static charges, care should be taken that during measurements and adjustments of the laser power supply the potentials of the alds and yourself equal the potential of the CD mechanism.

Detach light pin and connect laser simulator as follows: (connections on pre-amp PCB).
Take the flex PCB out of socket 11 and connect the simulator PCB with the socket.
Remove plug 16 and insert it in the socket on the simulator PCB.
Connect the plug with 4 wires to socket 16. Take out plug 17 and insert the plug with 1 wire in socket 17.

— Switch on the mains switch and ensure that the drawer is closed or else that the tray-end-in switch on the tray PCB (Sk2) is depressed.
  Now press the play key and check if the L-line of the servo μP, pin 17-2 on the pre-amplifier PCB, goes 'low'.
— In rest position the current through the laser diode should be $\leqslant$ 1 mA. For NEG. VOLT. lasers this can be checked as follows:
  Set the switch on the simulator PCB in the OFF position and the mains switch in the ON postion.
  Turn trimming resistor 3180 counterclockwise (min. R) and measure the voltage across resistor 3194 on the pre-amp. PCB.
  On pre-amplifier PCBs with discrete components turn resistor 3180 clockwise (min. R) and measure the voltage across resistor 3194.
  The voltage should be $\leqslant$ 15 V.

Check of laser supply control

Set the switch on the simulator PCB in the ON position and measure the voltages between points +V and —V on the simulator PCB.
Resistor 3180 clockwise (max. R): U_{+v-v}=225 mV±45 mV.
On preamplifier PCBs with discrete components resistor 3180 counterclockwise (max. R): U_{+v-v}=225 mV±45 mV.

R3180 counterclockwise (min. R): U_{+v-v}=750 mV ±150 mV.
On preamplifier PCBs with discrete components resistor 3180 clockwise (min. R): U_{+v-v}=750 mV±150 mV

Set resistor 3180 in the mid-position.
This is a preliminary adjustment. After the simulator PCB has been removed the laser current must be adjusted.

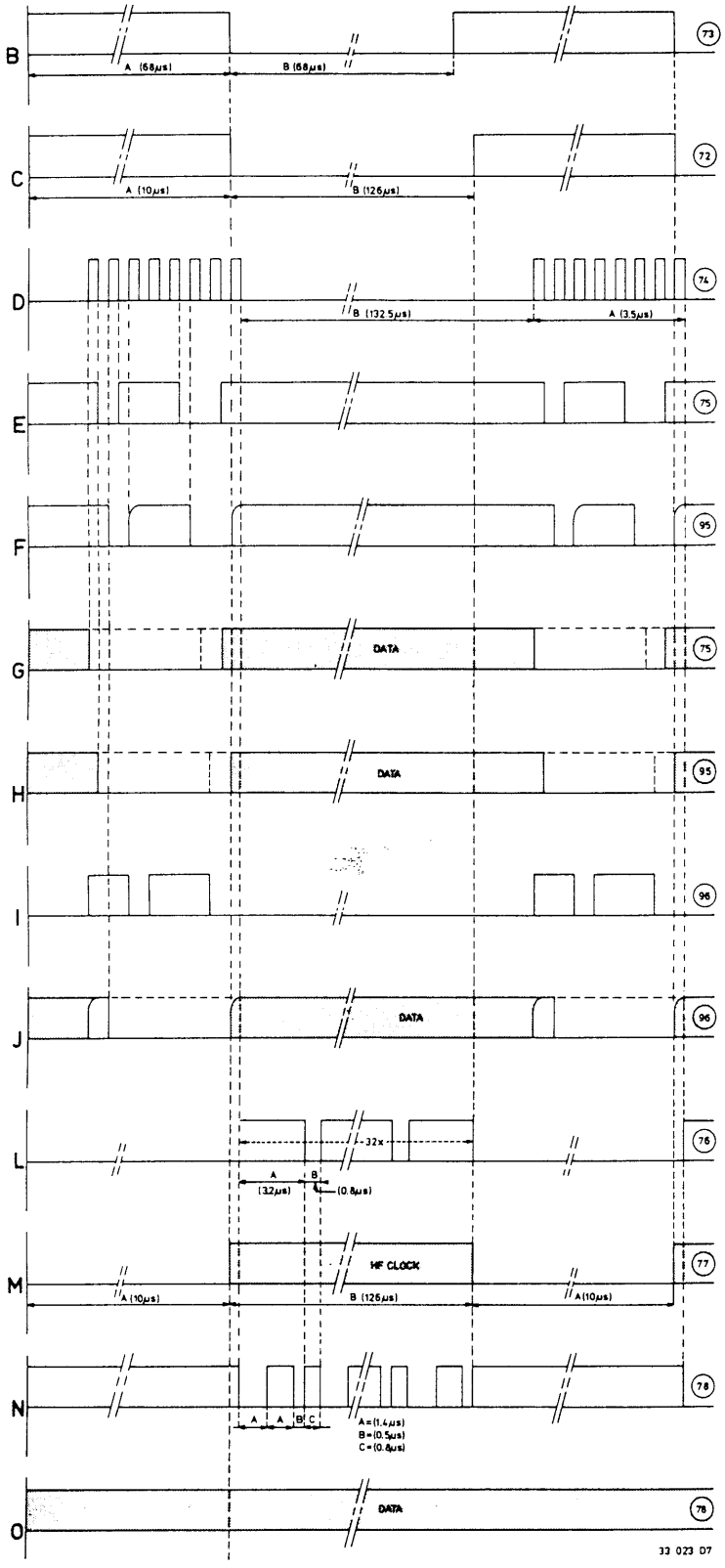
Fine adjustment of laser current

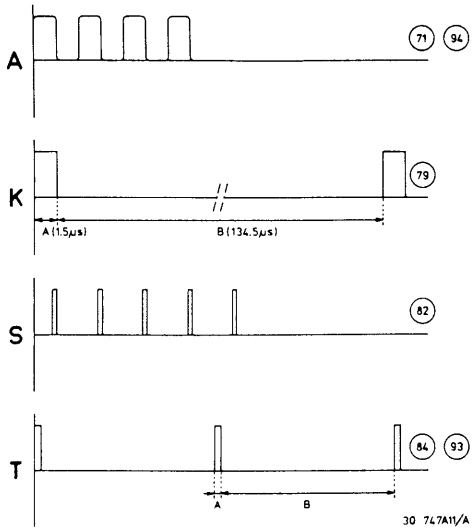
— Playback track 1 of test disc 4822 397 30096 (Disc without defects). Connect a DC voltmeter across resistor 3308 on the SERVO PCB circuit diagram D. Adjust the laser power supply with resistor 3180 until the voltage across resistor 3308 is 575 mV±50 mV.

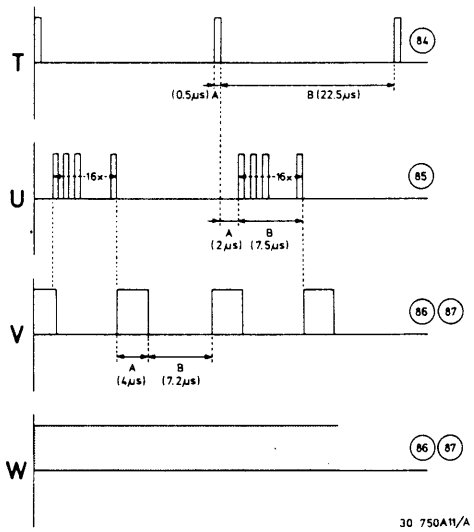
SERVO

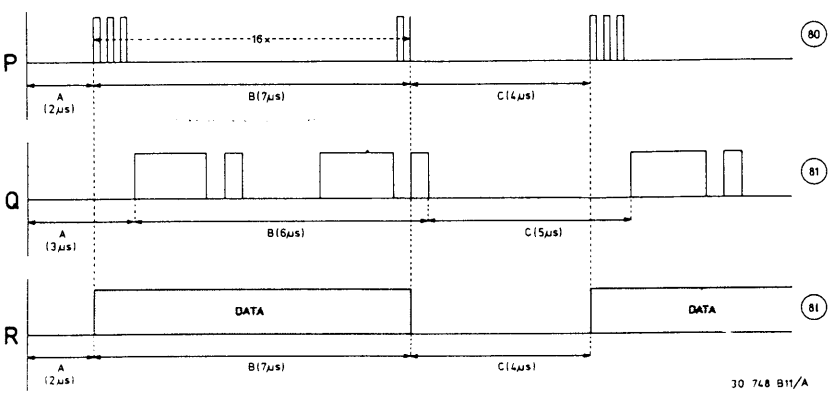
Nr.	See	Position	Amplitude	f	Time base
1		see fault finding meth.			
2	P	see fault finding meth.	0,6 Vp-p	10 Hz	
3	P	see fault finding meth.	6 Vp-p	10 Hz	
4	P	see fault finding meth.	5 Vp-p	10 Hz	
5	B	see fault finding meth.	40-80 mV	25-60 Hz	
6	B	see fault finding meth.	40-80 mV	25-60 Hz	
7	B	see fault finding meth.	40-80 mV	25-60 Hz	
8	B	see fault finding meth.	40-80 mV	25-60 Hz	
9	C	see fault finding meth.	—2 V	25-60 Hz	
10	C	see fault finding meth.	—2 V	25-60 Hz	
11	C	see fault finding meth.	—2 V	25-60 Hz	
12	C	see fault finding meth.	—2 V	25-60 Hz	
13	D	see fault finding meth.	—8 V, +8 V	25-60 Hz	
14	D	see fault finding meth.	depends on R3158	25-60 Hz	
15		see fault finding meth.			
17	G	see fault finding meth.	5-0 V		A = 140 µs
17	H	see fault finding meth.	0-5 V		A = 140 µs
20		see fault finding meth.			
21	J	see fault finding meth.	12-14 Vp-p		
22	J	see fault finding meth.	0,7 Vp-p		
23	J	see fault finding meth.	0,7 Vp-P		
24	J	see fault finding meth.	0,2 Vp-p		
25	J	see fault finding meth.	0,25 Vp-p		
26	J	see fault finding meth.	20 mVp-p		
27	J	see fault finding meth.	800 mVp-p		
28	J	see fault finding meth.	800 mVp-p		
29	J	see fault finding meth.	6 Vp-p		
29	P	ON	0,3 Vp-p		
30		see fault finding meth.			
31		see fault finding meth.			
32	*	see fault finding meth.			
33	*	see fault finding meth.			
35	J	see fault finding meth.	200 mVp-p		
36	J	see fault finding meth.	2 Vp-p		
37	K	see fault finding meth.	10 Vp-p		
38	K	see fault finding meth.	10 Vp-p		
39	L	see fault finding meth.	0-4 Vp-p		A = 769 µs B = 769 µs
40	K	see fault finding meth.	9 Vp-p		A = 769 µs B = 769 µs
40	M	see fault finding meth.	0-4 Vp-p		A = 769 µs B = 769 µs
41	N	see fault finding meth.	6 Vp-p		A = 769 µs B = 769 µs
45	P	ON	9 Vp-p	650 Hz	
46	Q	ON	0-5 V	650 Hz	A = 769 µs B = 769 µs
47	P	ON	1,5 Vp-p	650 Hz	
48	P	ON	1 Vp-p	650 Hz	
49	R	ON	0-5 V	650 Hz	
50	S	ON	0-5 V	650 Hz	
51	T	ON	5-0 V	650 Hz	
51	U	service loop B	5 V	650 Hz	
52		see fault finding meth.			
55	Y	service loop A	5-0 V		
55	W	play (with test disc)	5-0 V		
56	W	play (with test disc)	5-0 V		
57		see fault finding meth.			
60	X	service loop A	5-3 V		
61	Y	service loop A	5-0 V		
62	Y	service loop A	5-0 V		
65	A	play	1 Vp-p		
66	F	see fault finding meth.	0,25-2,5 V		A = 140 µs
66	G	see fault finding meth.	5-0 V		A = 140 µs
66	H	see fault finding meth.	0-5 V		A = 140 µs
67	J	see fault finding meth.			

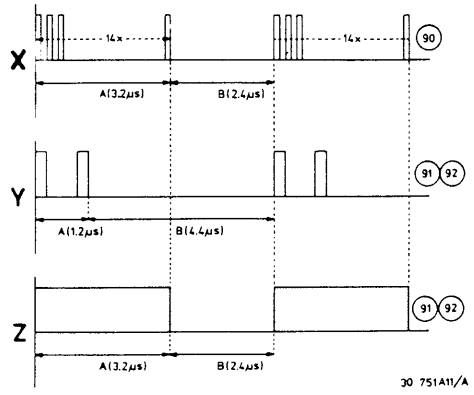
DECODING


B
A (68µs)
B (68µs)
73
C
A (10µs)
B (126µs)
72
D
B (132.5µs)
A (3.5µs)
74
E
75
F
95
G
DATA
75
H
DATA
95
I
96
J
DATA
96
L
32x
A (3.2µs)
B (0.8µs)
76
M
HF CLOCK
A (10µs)
B (126µs)
A (10µs)
77
N
A A B C
A=(1.4µs)
B=(0.5µs)
C=(0.8µs)
78
O
DATA
78
33 023 07


A
71 94
K
79
A (1.5µs)
B (134.5µs)
S
82
T
84 93
A
B
30 747A11/A


T
84
(0.5µs) A
B (22.5µs)
U
16x
16x
85
A (2µs)
B (7.5µs)
V
86 87
A (4µs)
B (7.2µs)
W
86 87
30 750A11/A


P
16x
80
A (2µs)
B (7µs)
C (4µs)
Q
81
A (3µs)
B (6µs)
C (5µs)
R
DATA
DATA
81
A (2µs)
B (7µs)
C (4µs)
30 748 B11/A


X
14x
14x
90
A (3.2µs)
B (2.4µs)
Y
91 92
A (1.2µs)
B (4.4µs)
Z
91 92
A (3.2µs)
B (2.4µs)
30 751A11/A

Remark:

It is recommended to use the laser simulator for any measurement in the laser supply, since incidental short-circuits with the test pin can have inconvenient consequences for the laser.

Annex II: CHECKING LOCKING- IN OF PLL CIRCUIT
(Test points on decoding PCB)

First the free-running oscillator should be checked as follows:

— Switch power on, player in pos. play.
— Connect a frequency counter between pin 22 of IC6501 (DEMOD) and ⊥.
— This frequency should be 4.350 MHz±30 kHz.

Attention

This adjustment should be performed immediately after the unit is switched on.

Checking locking-in:

— Insert disc, disconnect plug 14, inject 2,5 V_{dc} to the socket of plug 14 on pre-amp PCB and set player in service loop B.
— Variation of the DC round 2,5 V should be visible on the oscilloscope (point ◇71◇) in the form of a frequency variation. This means that the PLL is locking in.

Annex III: CHECKING d-FACTOR
(Test points on servo PCB)

— Switch off AGC circuit (k-multiplier) and switch off offset circuit (d-multiplier). See sub G and H.

Place disc on turntable and set player in service loop A.

— Check points ◇22◇ and ◇23◇.
  Value should be 0,7 V_{pp}.
  Frequency variation strongly depends on the eccentricity of the disc.
— Check point ◇25◇.
  Value should be 250 mV_{pp}.
— Check point ◇35◇.
  Value should be 200 mV_{pp}.
— Check point ◇36◇.
  Value should be 2 V_{pp}.
— Check points ◇37◇ and ◇38◇.
  Value should be 10 V_{pp}.
  The signal is more sine-shaped now due to filtering out of 650 Hz.
— Point ◇39◇ is hard to measure since switch is in position Y_{oc} and thus connected with input of op-amp 6215. However, a signal of 200 mV_{pp} is present.
— Check point ◇40◇.
  Value should be 9 V_{pp}.

Bring the player in service loop B. With a disc on turntable and the AGC and offset-circuits are still switched off.

— Check point ◇41◇.
— Check point ◇40◇ on beam A of oscilloscope and check point ◇39◇ on beam B of oscilloscope while oscilloscope is triggered with point ◇41◇.
— Switch on the AGC-circuit and the offset circuit.

Annex IV: CHECKING k-FACTOR
(Test points on Servo PCB)

a. Static

Switch power on **without** depressing the Play button.
I.e. RC0 = high; $\overline{RC0}$ = low so switch Y_a is in position 0 and switch Y_c is in position 0.

— Check point ◇45◇.
  Value should be 9 V_{pp}.
— Check point ◇46◇.
— On point ◇29◇ now appears a sine-wave signal of 650 Hz, 300 mV, and 180 - 45 = 135° shifted in phase relative to signal on point ◇45◇.
— Check point ◇47◇.
  Value should be 1,5 V_{pp}.
— Check point ◇48◇.
  Value should be 1 V_{pp}.
— Check points ◇49◇, ◇50◇, ◇51◇ and ◇46◇ relative to each other.
  Amplitudes are 5V.
— Check integrator IC 6212A.

b. Dynamic

Insert disc, select service loop A and check if the signal on point ◇21◇ equals to 7 V_{pp}.

— Select service loop B.
  Now $\overline{RC0}$ = high and RC0 = low.
  So switch Y_a is in position 1.
  Switch Y_c switches at f = 650 Hz.
  Point ◇52◇ is low; so point ◇51◇ is in phase point ◇50◇.
  Now Fig. U should be present on point ◇51◇ with duty cycle jittering round 50%.

Annex V: CHECKING RF PRE-AMPLIFIER
(measure points on pre-amp. PCB)

a. Check DC-voltages on transistors 6103, 6104, 6105, 6109, 6110, 6111.
b. For checking sensitivity, frequency and delay characteristic, proceed as follows:
  — Take flex PCBs of sockets 10 and 11.
  — Take plugs 18, 17, 12, 13, 14 and 15 out of sockets.

  Attention: do not take of plug 16 (= supply!).

  — Unscrew PCB to enable injection at the copper side of the PCB.

  Checking sensitivity

  — Inject V_{in} = 140 mV_{eff}, 50 kHz on points 102, 101 via R = 100 kΩ and C = 39 pF (see Fig. A).
  — V_{out} has to be 245 mV ± 2 dB.

Note:
Ensure that injection cord and test cord are identical.

Checking frequency and delay characteristic

— Adjust V_{in} in such a way that V_{out} = 245 mV = 0 dB at 50 kHz.
— Between the injected and the measured sine-wave signal the delay should be 450 ns ± 50 ns at 300 kHz. This can be measured on the dual beams oscilloscope with V_{in} on beam A and V_{out} on beam B according to Figure B.
— Check frequency and delay characteristic for frequencies given below:

Frequency (kHz)	V_{out} (dB)	Delay (n sec.)	Delay, compared with delay at 300 kHz
1	−15 ±3		
6,3	− 2 ±1		
16	− 0,5 ±1		
50	0		
100	0 ±1		−50 ±20
200	+ 1 ±1		0 ±20
300	+ 1,5 ±1	450 ±50	0
500	+ 3,5 ±1		+20 ±20
700	+ 5,5 ±2		+30 ±20
1000	+ 8 ±2		+30 ±20
1600	+ 8 ±2		
2000	+ 4,5 ±3		

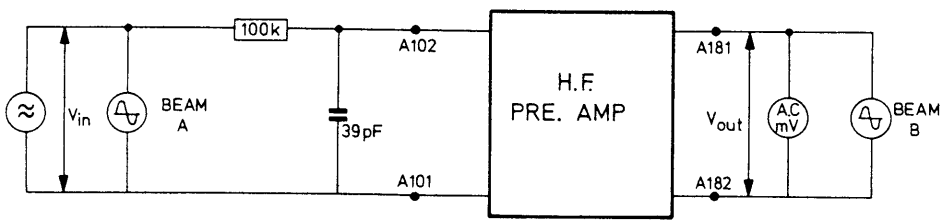


Fig. A 33 393A12

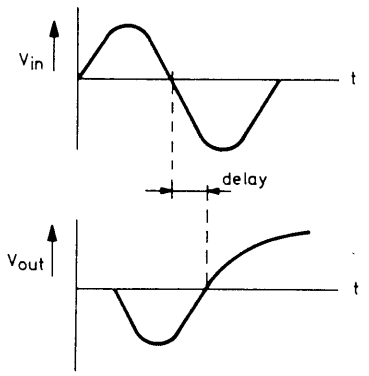
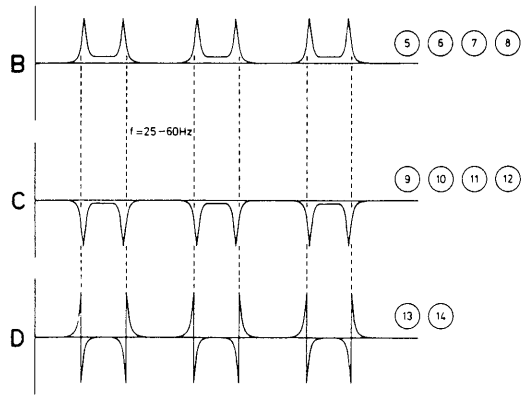
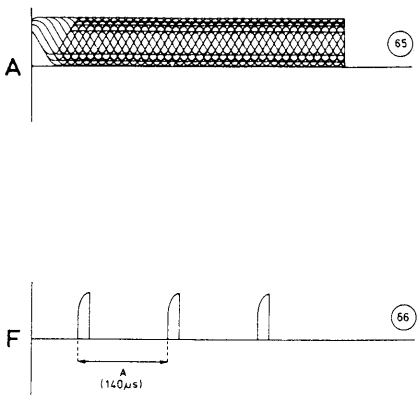
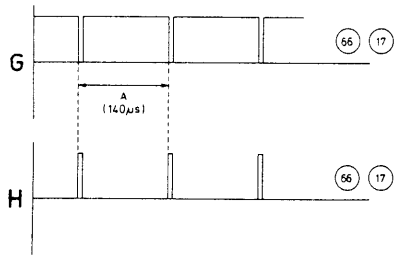


Fig. B 33 394A12





30 742 B12/A



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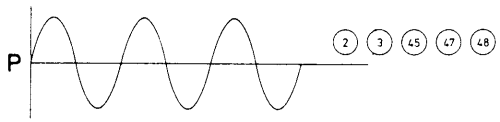

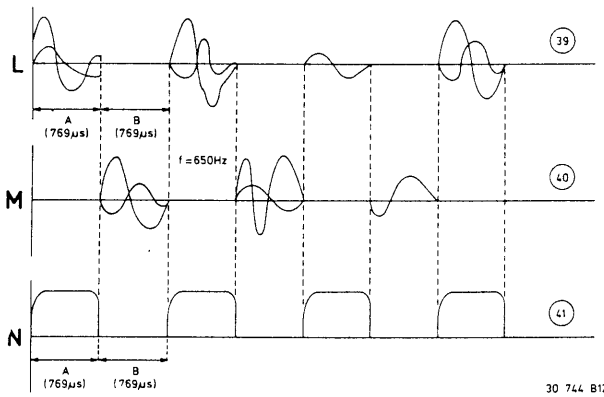

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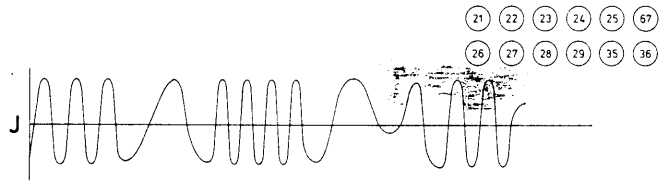

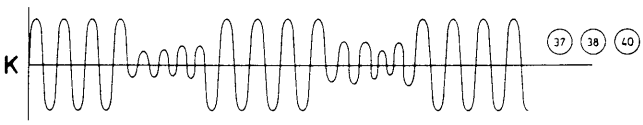

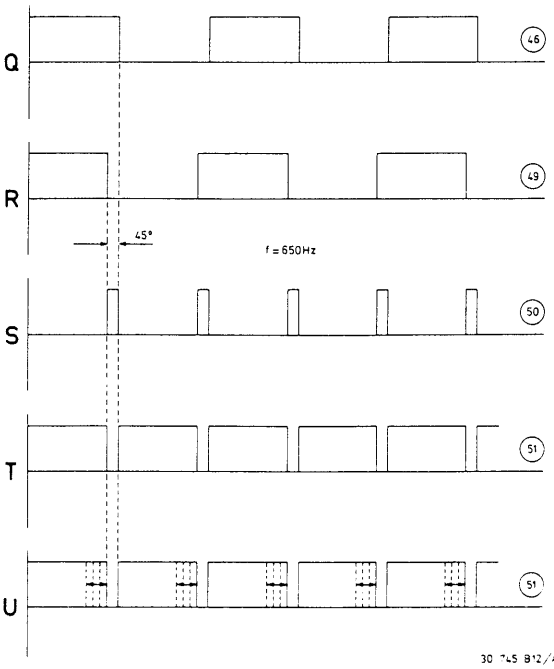

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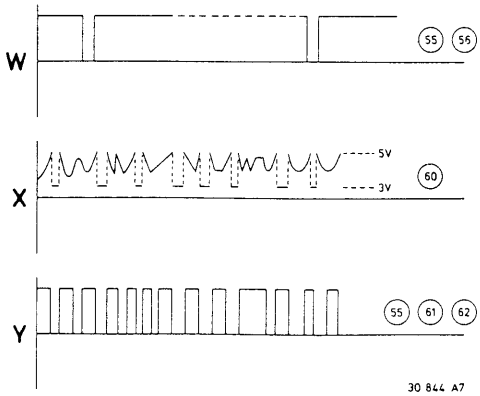

30 844 A7

8 CHANGES

SHEET CHANGES

Introduced with A84-143 of 1984-11-15

Description		Reason
Front sheet		CD104/07/30 added, reference to CDM documentations changed
Table of contents	1-2-a	Table of contents adapted
Technical specification	2-2-a	Specification de-emphasis adapted
Servicing hints	3-1-a	Text adapted
Servicing hints	3-2-a	Text adapted
Mechanical measurements and adjustments	4-1-a	Text adapted
Electrical measurements and adjustments	4-2-a	Text adapted
Exploded view "Tray" and parts list	5-1-a	Drawing + parts lists adapted
Exploded view "cabinet"	5-2-a	Drawing adapted
Block diagram	6-1-a	Drawing adapted
Power supply circuit diagram	6-2-a	Drawing adapted + transformer connection diagram added
PCB drawings	6-3-a	Drawing + parts list adapted
Power supply and mains filter		
Control + display diagram	6-4-a	Diagram adapted to stage of production
Control + display	6-5-a	Drawing + parts list adapted to stage of production
PCBs + parts list		
Servo diagram part 1	6-9-1	Diagram adapted to stage of production
PCB drawing servo	6-9-2	Drawing + parts list adapted to stage of production
PCB drawing servo	6-9-3	Drawing + parts list adapted to stage of production
Servo diagram part 2	6-9-4	Diagram adapted to stage of production
Wiring	6-15-1	Wiring adapted to production
Fault finding method	7-1-a	Text adapted
Fault finding method	7-2-a	Text adapted
Fault finding method	7-3-a	Text adapted
Fault finding method	7-4-a	Text adapted
Fault finding method	7-5-a	Text adapted
Fault finding method	7-8-a	Text adapted

COMPONENT CHANGES

Introduced with A84-143 of 1984-11-15

Sheet 5-1 Exploded view "Tray"
See added change sheet 5-1-a

Change:
Spring item number 111 deleted

Reason:
Spring has no function

"Tray" parts list

Change:
Item number 111 deleted

"Cabinet" parts list

Addition:
Components for CD104/07/30 added

Sheet 5-2 Exploded view "cabinet"
See added change sheet 5-2-a

Addition:
Lens item number 205

Reason:
Improve visibility of display

Sheet 6-2 Power supply circuit diagram
See added change sheet 6-2-a

Deleted:
Diode 6468

Reason:
Diode appeared superfluous after safety tests

Sheet 6-3 Power supply PCBs and parts list
See added change sheet 6-3-a

Change:
Diode 6468 deleted and replaced by interconnection

Correction to parts list:
Diode type 1N002G should be 1N4002G
Code number 5322 130 30684 is correct

Sheet 6-4 Control and display diagram
See added addition sheet 6-5-1

Addition:
1051 quartz crystal 6 MHz
2051, 2052 tubular ceramic capacitor 27 pF
3051 resistor 1 MΩ - SFR25
3068 resistor 10 kΩ - SFR25

Reason:
With the introduction of servo microprocessor MAB8440/D041 the display microprocessor gets its own crystal oscillator which takes care of the timing (previous version servo μP MAB8440/D034). As a result the screened wire to the servo μP pin 16 will be deleted.

Correction:
2055 tubular ceramic capacitor 22 nF should be 2,2 nF

Remark:
The control and display PCB with these changes has been marked by a round yellow sticker "C"

Sheet 6-5 Control and display PCBs and parts list
See added addition sheet 6-5-2

Addition to PCB drawings:
1051 quartz crystal 6 MHz
2051, 2052 tubular ceramic capacitors 27 pF
3051 resistor 1 MΩ - SFR25
3068 resistor 10 kΩ - SFR25

Addition to parts list:

IC base 28P		4822 255 40156
1051	quartz crystal 6MHz	4822 242 70392

Remark:
The control and display PCB with these changes has been marked by a round yellow "C" and following

Sheet 6-6 "Servo 1" circuit diagram
See added addition sheet 6-9-1

Change:
2228 will be 1μF - 25V solid aluminium capacitor (was 100 nF -63V polyester capacitor)

Reason:
Improvement of the lock-in behaviour through delay in the motion of the focus motor

3203 will be 360 kΩ chip resistor (was 330 kΩ)

Reason:
To improve locking-in

3256 and 3273 will be safety resistors of 4,7 Ω (was 4,7 Ω - SFR25)

Reason:
Improve safety

6201 servo μP will be MAB8440/D041 was MAB8440/D034

Reason:
Changed programme in view of motor brake circuit

6248 will be diode BAW62 was BAT85

Reason:
Introduction of motor brake circuit

Deleted:
3212 - 3906 - 6237

Reason:
Introduction of motor brake circuit renders these components superfluous

The screened wire from pin 16 of the servo μP to display μP pin 15 has also been deleted with the introduction of servo μP MAB8440/D041

Reason:
Display μP MAB8410/B017 has its own crystal clock

Addition:
3906 - 3924 - 3925 chip jumper 0 Ω

Reason:
Added in view of adaptation conductor pattern

Correction:
2217 will be solid aluminium capacitor 6,8 μF - 10V (was electrolytic capacitor 6,8 μF - 16V)
3264 0E deleted
3241 18 kΩ - SFR25 will be 3230 18 kΩ - SFR25 (correction name)
5501 will be 5201 (name 5501 was double)
6259 will be BAW62 (type designation added)

Remark:
The servo PCB with these changes has been marked by a round yellow sticker "B"

Sheet 6-7 Servo PCB and parts list
See added addition sheet 6-9-2

Change:
Focus delay PCB has been integrated on servo PCBs
Connector 29 added thus adapting the conductor pattern

Correction:
5501, 5502, 5503 will be 5201, 5202 and 5203 (names 5501, 5502 and 5503 were double)

Remark:
The servo PCB with these changes has been marked by a round yellow sticker "B"

Additions to parts list:

	MAB8440/D041 servo µP	4822 209 10916
2217	6,8 µF - 16V	4822 124 21538
2228	1 µF - 25V	4822 124 21457
3256, 3273	fuse res. 4,7 Ω	4822 111 50483

Deleted on parts list:

BAT85		4822 130 31983

Change on parts list:
5501 will be 5201

Sheet 6-8 Servo PCB and parts list
See added addition sheet 6-9-3

Change:
See changes of sheet 6-7

Additions on parts list:

1E5	Chip resistor	4822 111 90381

Change on parts list:
5502, 5503 will be 5202, 5203

Sheet 6-9 "Servo 2" circuit diagram
See added addition sheet 6-9-4

Change:
3387 will be 1,5 Ω chip resistor (was 2,2 Ω)

Reason:
Adaptation as a result of material change for magnets for CDM

Change:
5502, 5503 will be 5202, 5205

Reason:
Correction of double name

Sheet 6-10 "Decoding 1" circuit diagram

As a result of the replacement of coil 5502 by an interconnection all +2a power supply voltage are changed in +2

Sheet 6-11 Decoder on PCB and parts list

Remark:
On the decoder PCB a connector may be present under the AF connection points. This has been done to render the decoder PCB of CD104 also suitable for CD304. The connector in CD304 serves for connection of the headphone PCB.

Deleted on PCB and parts list:
5501 4822 156 21155 (an interconnection will be applied to PCB)

Sheet 6-12 Decoder PCB and parts list
See remark on sheet 6-11

Correction:
Test point 64 on connector 33-3 should be test point 65

Sheet 6-13 "Decoding 2" circuit diagram

Deleted:
Coil 5502 is replaced by an interconnection
All +2a power supply voltages changed in +2 power supply voltage

Sheet 6-14 "Tray control" circuit diagram
See added addition sheet 6-14-1

Change:
6802, 6803 and 6805 will be BC548B (were BC547B)
6804, 6806 will be BC558B (were BC557B)

Reason:
In production BC548B and BC558B are used

3814 will be 12E - NFR25 (was 5E6 - NFR25)
3816 will be 5E6 - NFR25 (was 12E - NFR25)

Reason:
Resistance values of 3814 and 3816 interchanged

Deleted:
2801

Reason:
In servo µP MAB8440/D041 the delay of SL1 has been provided for in the software.
The delay on the tray PCB will be superfluous then and can be switched off by removing 2801, thus making it possible to use up the stock.
PCBs with this change are marked by a round yellow sticker "A".

Tray control" PCBs
See added addition sheet 6-14-1

Deleted:
2801

Reason:
See sub "circuit diagram"

"Tray control" parts list
Change:

BC547B	will be BC548B	4822 130 44196
BC557B	will be BC558B	4822 130 44197
3814	will be 12E-NFR25	4822 111 30511 (was 5E6)
3816	will be 5E6-NFR25	4822 111 30502 (was 12E)

Sheet 6-15 Wiring
See added addition sheet 6-15-1

Wiring adapted to stage of production

Nr.	See	Position	Amplitude	f	Time base
71	A	play	0-5 V	4,35 MHz	
72	C	stop/play	0-5 V		A = 10* µs B = 126 µs
73	B	stop/play*	0-5 V	7,35 kHz	A = 68 µs B = 68 µs
74	D	stop/play	5-0 V		A = 3,5 µs B = 132,5 µs
75	E	stop	5-0 V		A = 3,5 µs B = 132,5 µs
75	G	play	0-5 V	DATA	
76	L	stop/play	0-5 V		A = 3,2 µs B = 0,8 µs
77	M	stop/play	0-5 V		A = 10 µs B = 126 µs
78	N	stop	0-5 V		A = 1,4 µs B = 0,5 µs C = 0,8 µs
78	O	play	5 V	DATA	
79	K	stop/play	0-5 V		A = 1,5 µs B = 134,5 µs
80	P	stop/play	0-5 V		A = 2 µs B = 7 µs C = 4 µs
81	Q	stop/play	0-5 V		A = 3 µs B = 6 µs C = 5 µs
81	R	play	0-5 V		A = 2 µs B = 7 µs C = 4 µs
82		stop	5 V	DC	
82	S	play with Drop-out test record	0-5 V		
84	T	stop/play	0-5 V		A = 0,5 µs B = 22,5 µs
85	U	stop/play	0-5 V		A = 2 µs B = 7,5 µs
86	V	stop	0-5 V		A = 4 µs B = 7,2 µs
86	W	play	0-5 V		DATA
87	V	stop	5 V		A = 4 µs B = 7,2 µs
87	W	play	5 V		DATA
90	X	stop/play	0-5 V		A = 3,2 µs B = 2,4 µs
91	Y	stop	0-5 V		A = 1,2 µs B = 4,4 µs
91	Z	play	0-5 V		A = 3,2 µs B = 2,4 µs
92	Y	stop	0-5 V		A = 1,2 µs B = 4,4 µs
92	Z	play	0-5 V		A = 3,2 µs B = 2,4 µs
93	T	stop/play	0-5 V		A = 0,4 µs B = 5,5 µs
94	A	stop/play	0-5 V	4,23 MHz	
95	F	stop	5-0 V		
95	H	play	5-0 V		
96	I	stop	0-5 V		
96	J	play	5-0 V		

* In pos. stop, signal is only present **after** the set was brought in play mode.

Service
Service
Service Information

1984-11-15

CD104

A84-143

Voor het aanpassen van de Service Manual aan de huidige produktiestand zijn onderstaande pagina's gewijzigd/toegevoegd.

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